Appendix F: Atmospheric Fluidized Bed Boiler System Descriptions and Troubleshooting Diagrams

This TSG Appendix deals with identifying and solving potential coal quality-related problems that can be encountered in underfeed stoker-fired boiler systems. A general description of this system is included, but is limited to describing the major components that make up a complete Atmospheric Fluidized Bed Combustor (AFBC). For those interested, more detailed descriptions are provided in reference 11.

This Appendix includes a generalized block flow diagram of a complete overfeed stoker-fired boiler system that:

- identifies the specific components comprising the major subsystems of an overfeed stoker-fired boiler system
- logically presents the flow of coal, flue gas, and ash through the system
- helps determine the existence and location of subsystems and specific components comprising the system.

Following the block flow diagram is a component/symptom table that serves to identify:

- typical symptoms (problems) that may be encountered in the system
- the various components shown in the block flow diagram affected by these symptoms
- the logic diagram to determine whether the problem is due to operational procedures or to out-of-specification coal.

The Troubleshooting Logic Diagrams for this Appendix are presented next. However, before proceeding, the reader is encouraged to read Chapter 2 to understand the structure of each Appendix and how to apply these logic diagrams to diagnosing coal quality-related problems. The Glossary, List of Abbreviations, and References preceding the Appendixes should resolve any questions that arise regarding terminology and laboratory procedures.

F1 System Description

A typical bubbling fluidized bed boiler is shown in Figure 6-1. Much of the boiler itself (often called a "combustor" in fluidized bed nomenclature) and the flue gas train is identical with that found in other solid fuel firing units. The boiler and convective backpasses are similar in design, with soot blowers and mechanical collectors used to remove entrained solids. The air heater, ductwork, fans, and stack are similar to those found in other boilers. The differences center on the bottom of the combustor itself.

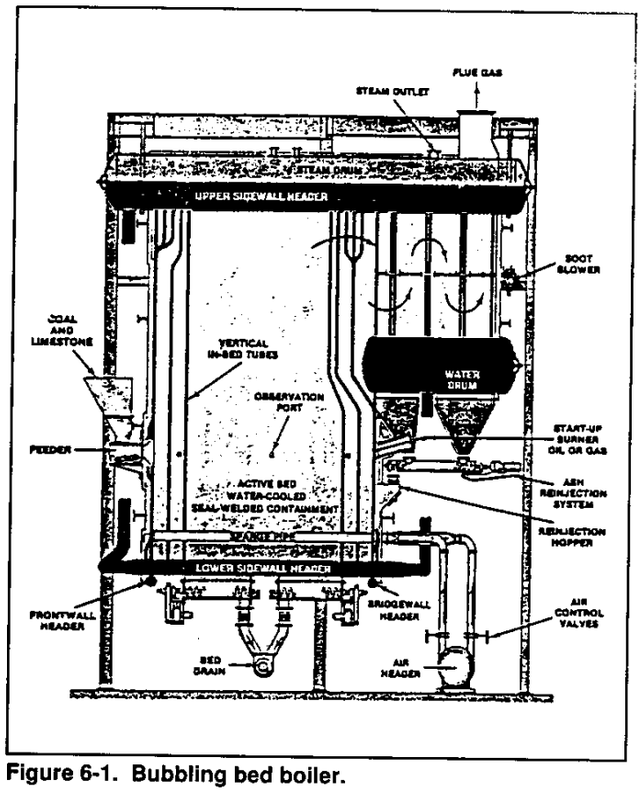


Figure 6-1. Bubbling bed boiler.

Combustor air enters at the bottom of the unit through a distributor to uniformly lift (fluidize) the fuel and bed material. Fluidization occurs whenever air or other fluid passes upward through the solid particles and lifts the solids. Fluidized Bed combustion is becoming increasingly attractive because of several inherent advantages over conventional combustion systems. These advantages are added fuel flexibility, low NOx emissions, and better control of SO_2 emissions.

The main configurations of Fluidized Bed include: bubbling bed with or without in-bed tubes, circulating-fluidized bed (CFB) designs with or without external heat exchangers, and atmospheric or elevated-pressure operation. This Appendix will be limited to the more common atmospheric fluidized bed combustion. In the bubbling bed technology, the lifting of the solids is slight; the solids "float" in the upward moving combustion air. These solids form a "bed" over an air distributor. As the air velocity increases, the bed expands more and more as the solids are lifted higher. At some point, the bed is lifted up and out of the combustion chamber. Circulating FBC's operate with this higher velocity. Figure 6-2 shows circulating bed combustors.

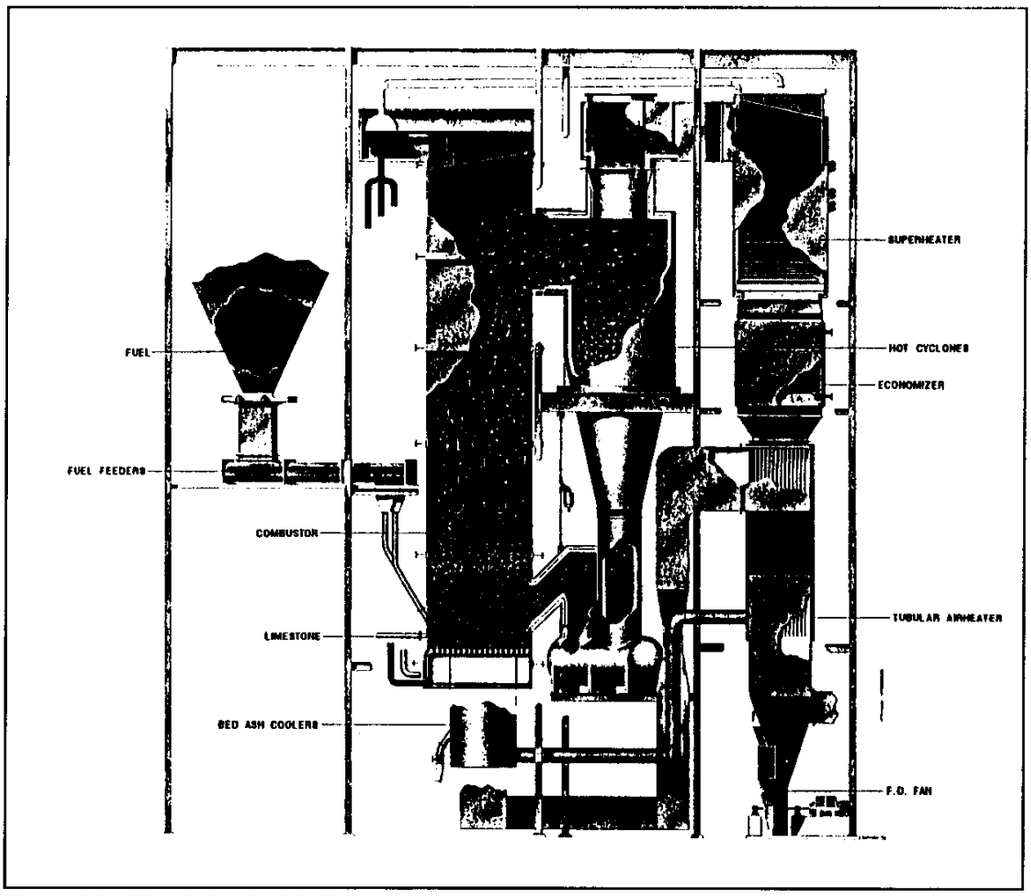


Figure 6-2. Circulating bed boiler.

In a typical FBC unit, solid, liquid, or gaseous fuel or fuels (especially coal and solid waste fuels), together with inert materials (for example, sand, silica, alumina, or ash) and/or a sorbent such as limestone or dolomite are kept suspended (fluidized) through the action of the primary air distributed below the combustor floor.

Turbulence is promoted by fluidization making the entire mass of solids behave much like a fluid. Improved mixing generates heat at a substantially lower and more uniformly distributed temperature than a stoker-fired unit or a pulverized-coal burner. Figure 6-3 shows the fundamental features of a typical FBC.

F2 Block Flow Diagram

The AFBC boiler system has been divided into 15 specific subsystems or components (the performance of which can be significantly impacted by coal quality), sequentially arranged to show:

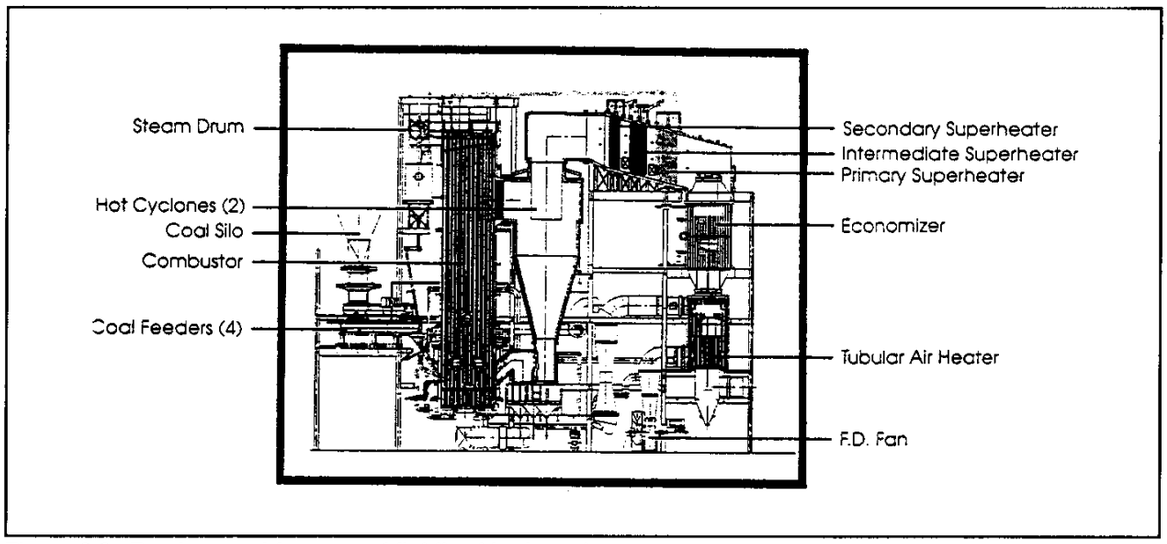


Figure 6-3. Fundamental features of fluidized bed combustor.

- coal flow through the coal handling equipment
- limestone flow through the limestone handling equipment
- flue gas flow through the boiler/components, flyash recycle, the induced draft fan, and chimney/stack
- ash discharge to the ash hopper/pit.

These specific components are identified in Figure 6-4. The first four components have been grouped collectively under a category entitled coal-handling equipment. The coal handling equipment includes all components that process the coal from its delivery on site to the fluidized bed. It includes equipment that, depending on plant design, may include:

- coal reclaim systems such as belt feeders, vibrating feeders, screw feeders, and reciprocating feeders
- coal feed conveyors such as belt conveyors, screw conveyors, bucket conveyors, redler conveyors, and chutes
- components that store the coal such as bunkers and hoppers
- coal feeders that transport coal to the coal hopper

The next two components are grouped under a category called "Limestone Handling Equipment." The limestone handling equipment includes the Bunker where it is stored, and the feeder linestore.

The next four components have been loosely grouped under the category entitled "Boiler/Components." Again, it includes equipment such as:

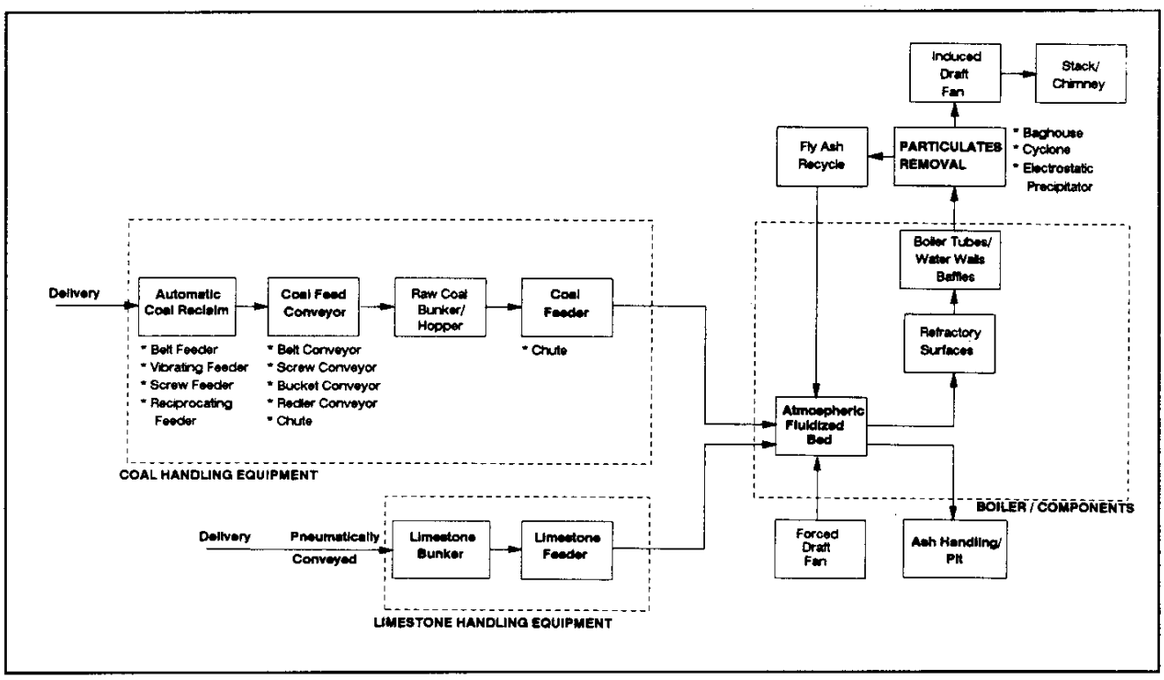


Figure 6-4. Atmospheric fluidized bed boiler system components block flow diagram.

- forced draft fan
- the fluid bed (combustor)
- refractory surfaces
- heat transfer surfaces (boiler tubes, water walls, and baffles).

The next two blocks represent the flyash recycle and particulate removal.

Three particulate removal options separately or in combination will be considered: Mechanical Dust Collectors (cyclones), electrostatic precipitators, and baghouses.

The next subsystem identified in the block flow diagram is the fan subsystem. AFBCs use a number of fans to move air and flue gas. The major fan types addressed in the guide include:

- forced draft (FD) fans, which supply air to fluid bed
- induced draft (ID) fans, which withdraw flue gas from the furnace and balance furnace pressure.

All the fans can be impacted by changes in coal quality.

The final subsystems addressed in the guide include those components supplied to handle ash. Specific components include the chimney/stack and the ash hopper/pit.

F3 Troubleshooting Logic

The component/symptom guide table (Figure 6-5) serves to identify:

- Typical symptoms (problems) that may be encountered in AFBC systems. These symptoms are arranged horizontally along the top of the table.
- The various components shown in the block flow diagram affected by these symptoms. These components are listed down the left hand side of the table in the same logical fashion as they are arranged in the block flow diagram.
- The location of the logic diagrams.

The remainder of this Appendix consists of 83 logic diagrams, arranged by component and by all the symptoms that can affect that component.

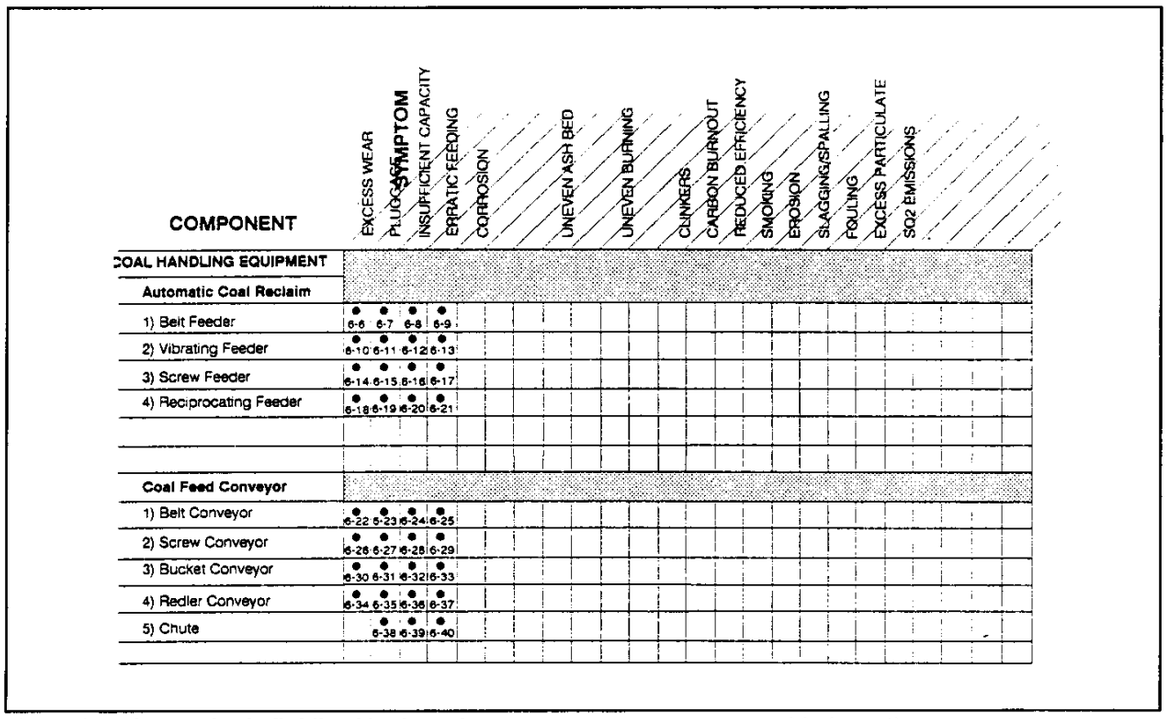


Figure 6-5. Atmospheric fluidized bed combustor—component system guide (part 1).

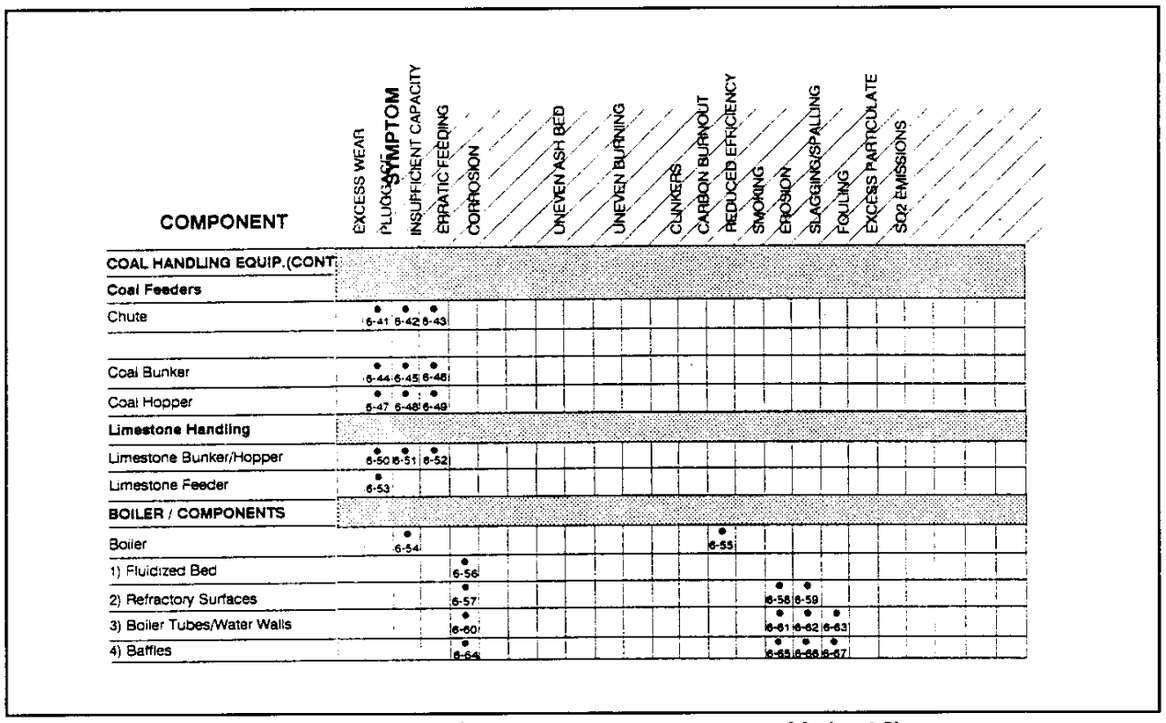


Figure 6-5. Atmospheric fluidized bed combustor—component system guide (part 2).

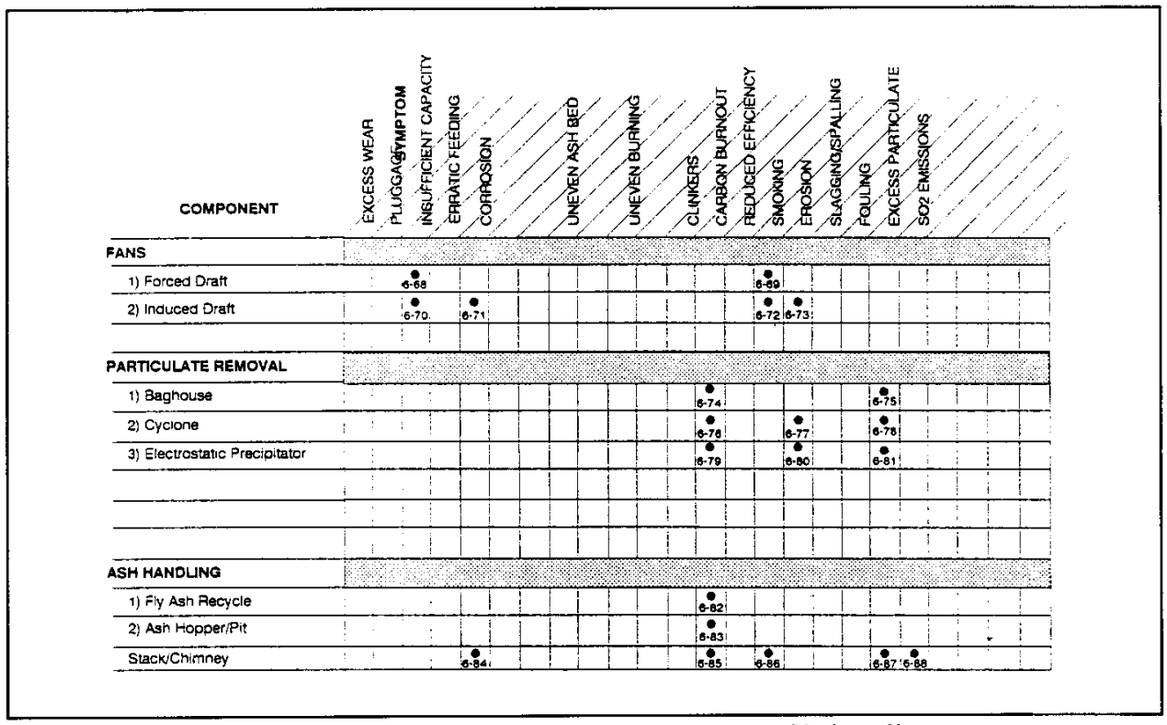


Figure 6-5. Atmospheric fluidized bed combustor—component system guide (part 3).

FIGURE 6-6: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Excess Wear Of The Automatic Coal Reclaim (Belt Feeder)

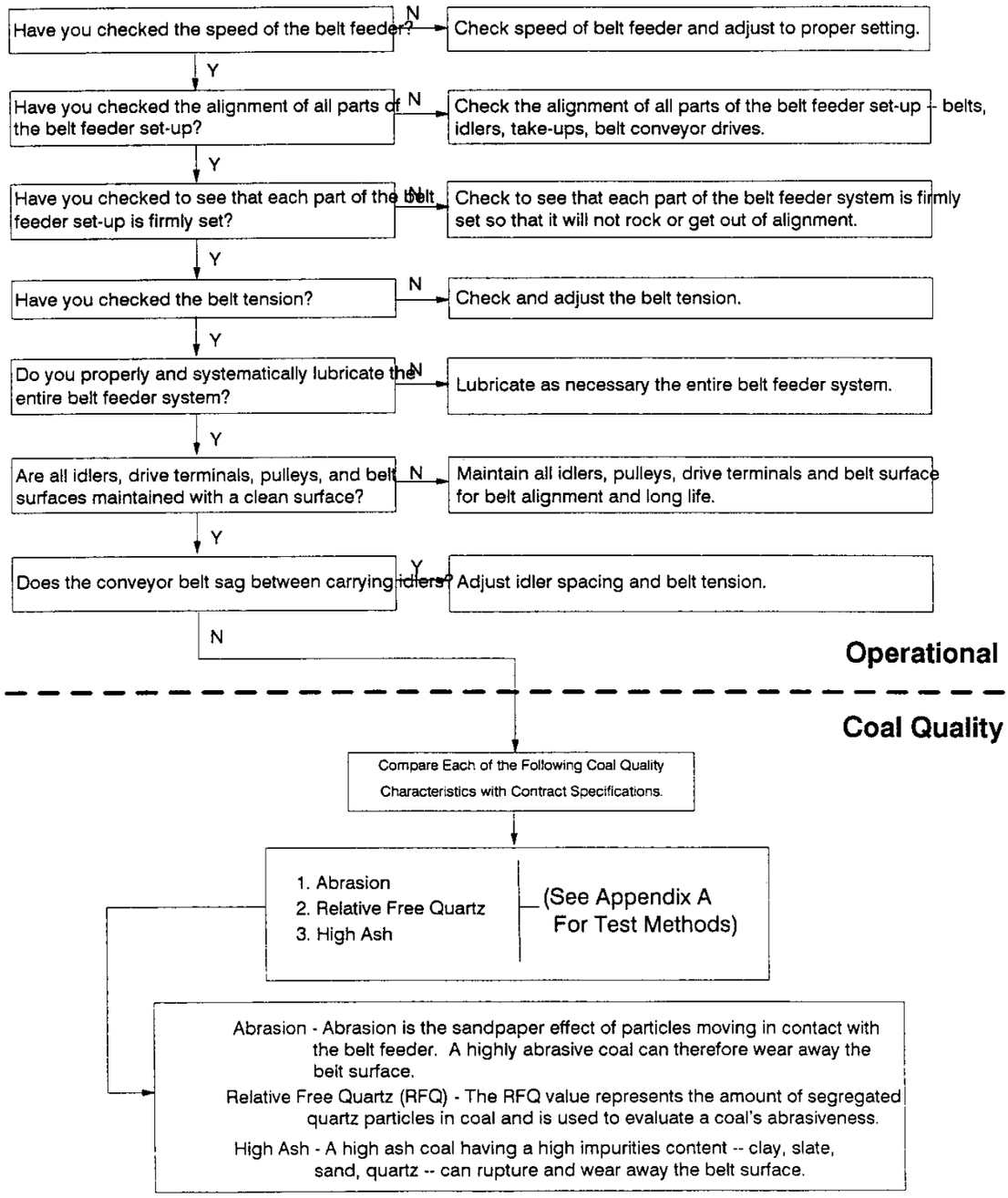


Fig 6-6n/1

FIGURE 6-7: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Belt Feeder)

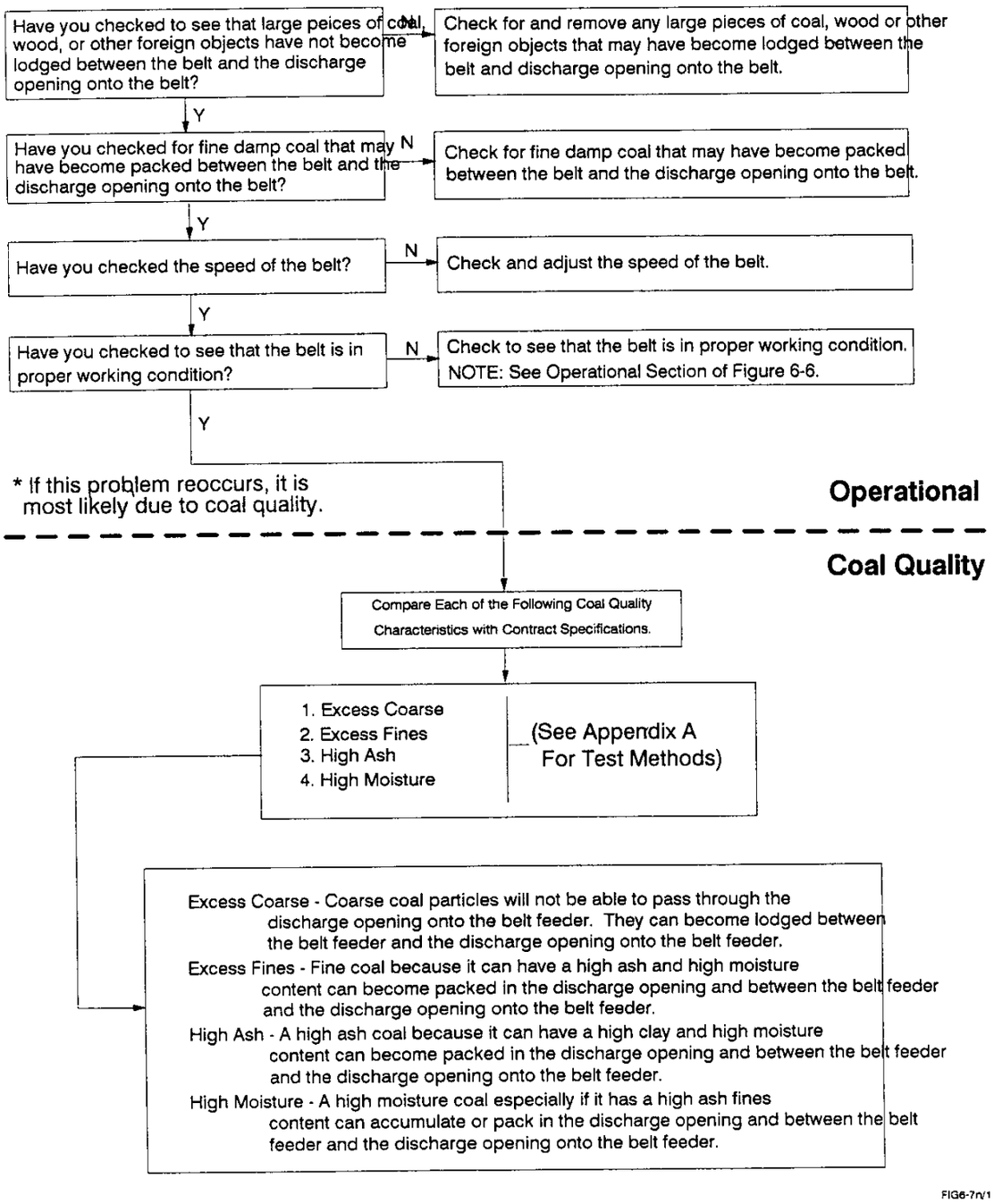


FIGURE 6-8: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim (Belt Feeder)

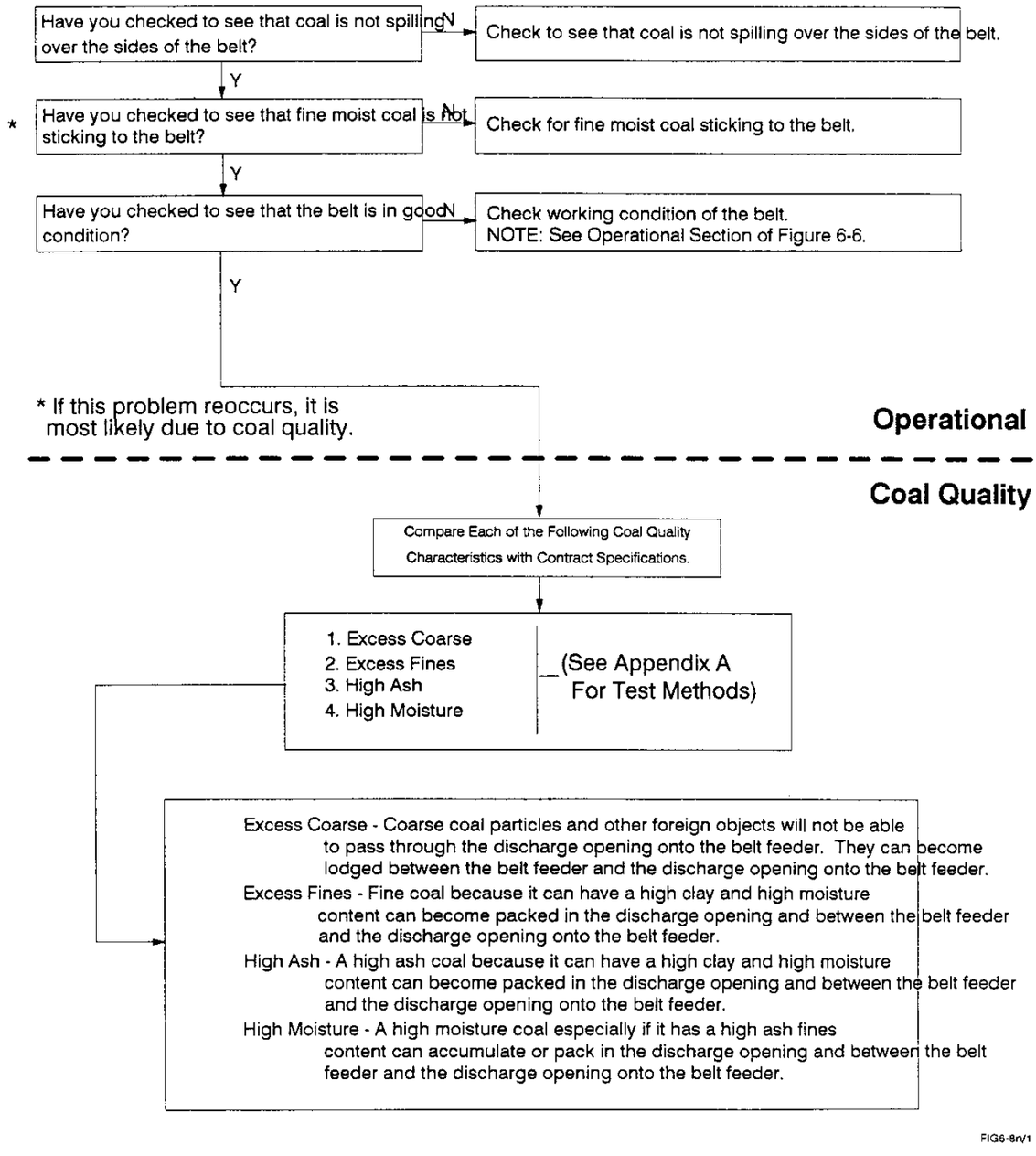


FIGURE 6-9: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim (Belt Feeder)

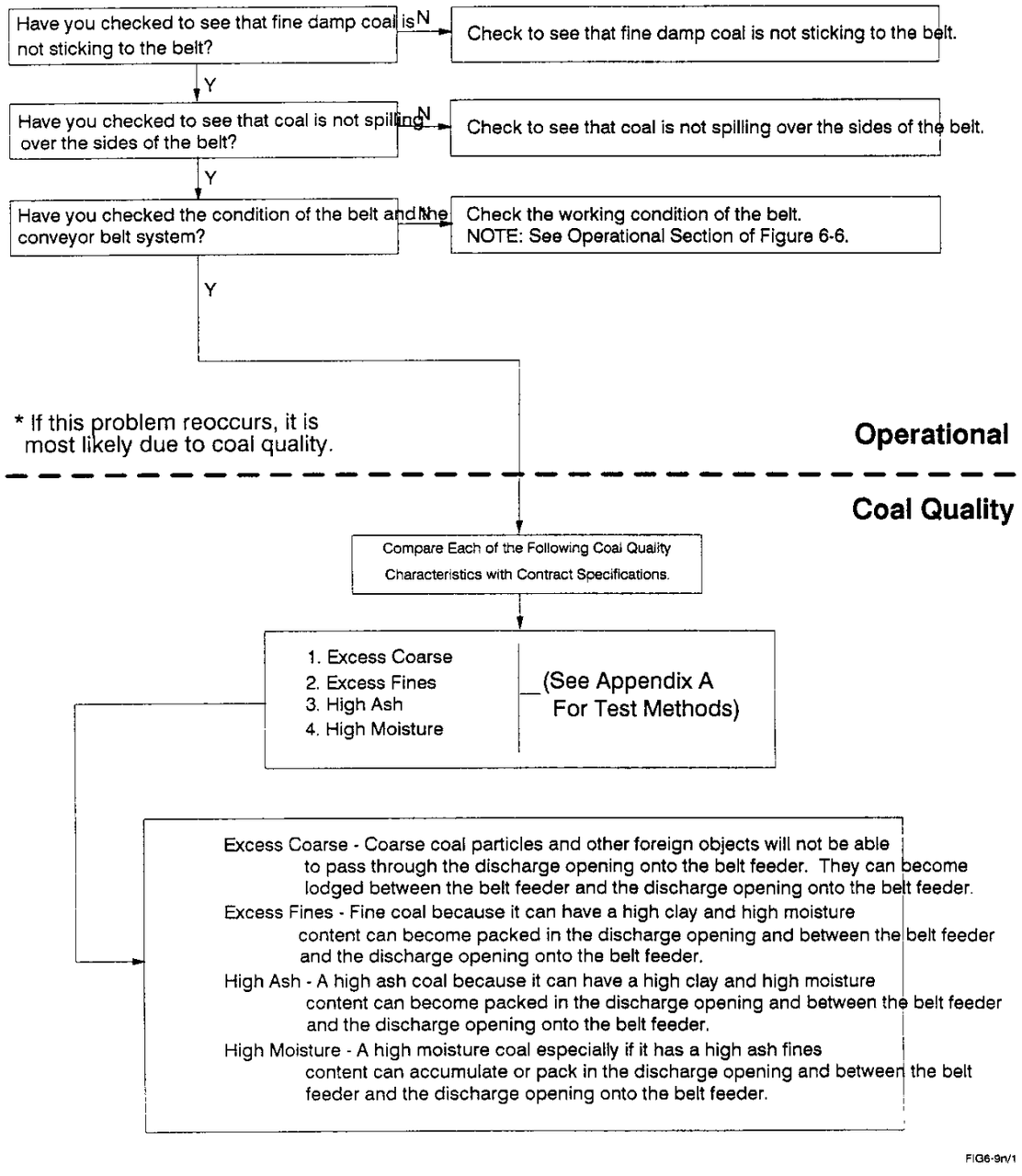


FIGURE 6-10: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Vibrating Feeder)

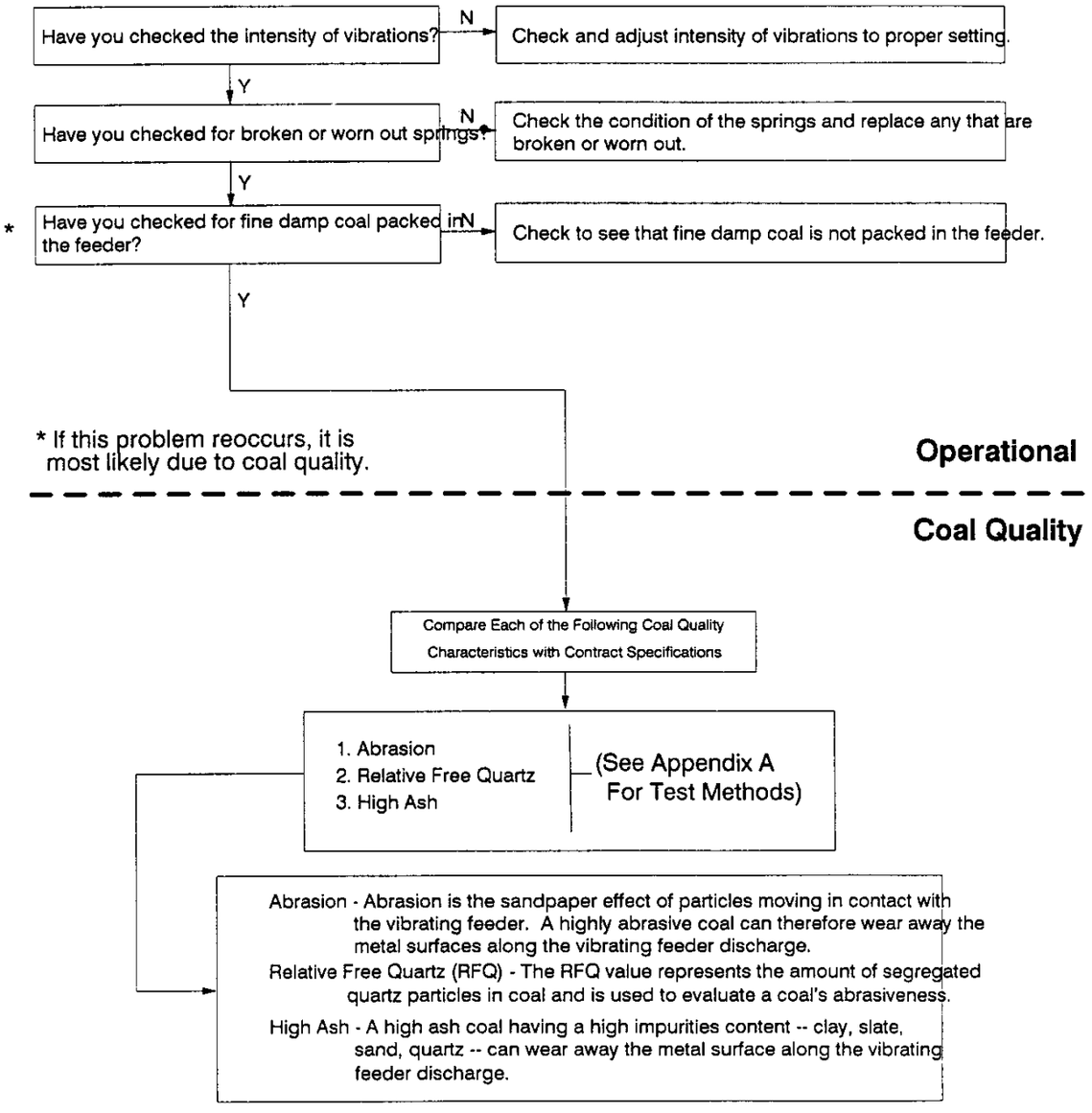


FIG6-10n/1

FIGURE 6-11: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Vibrating Feeder)

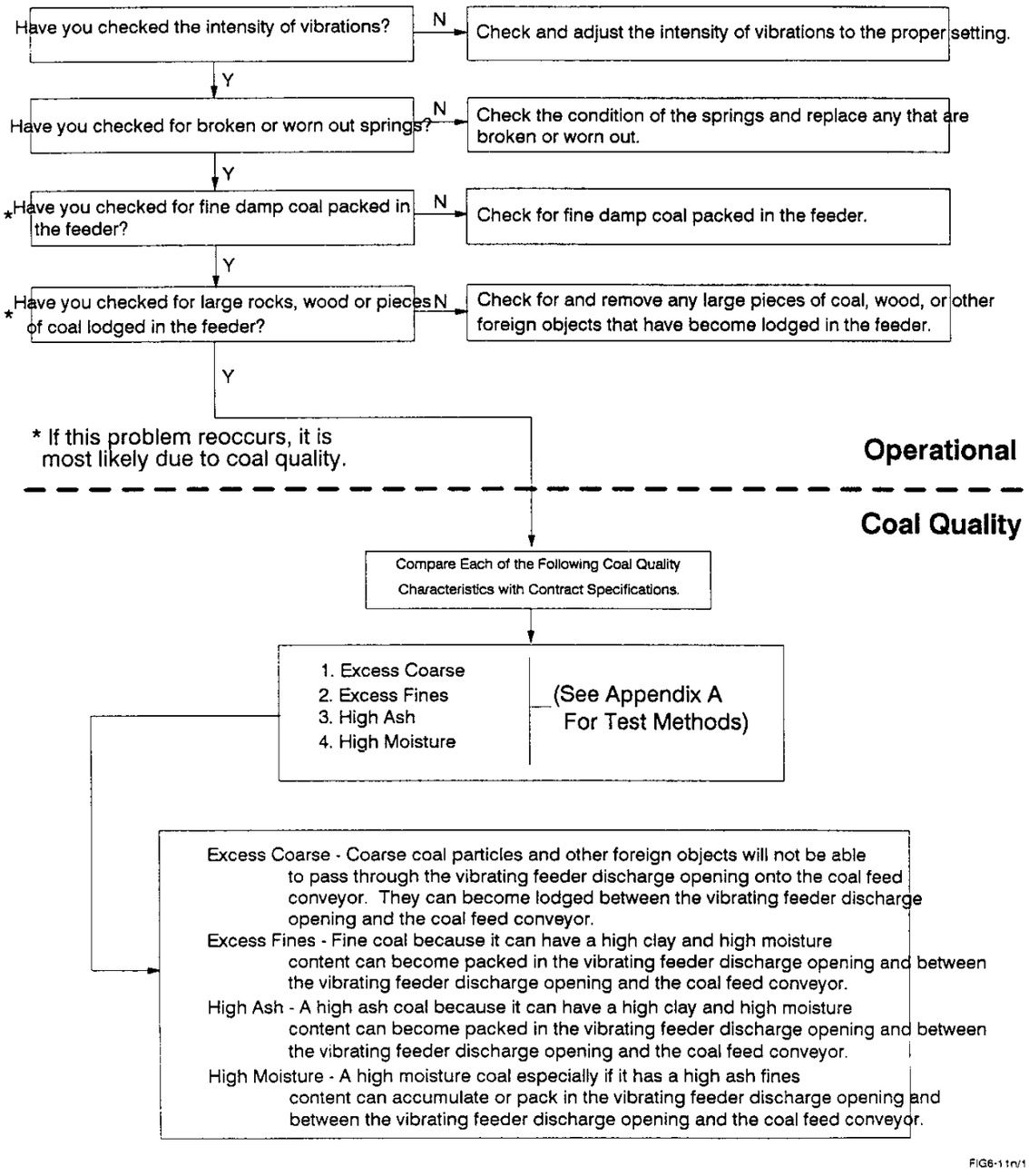


FIG6-11n/1

FIGURE 6-12: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim (Vibrating Feeder)

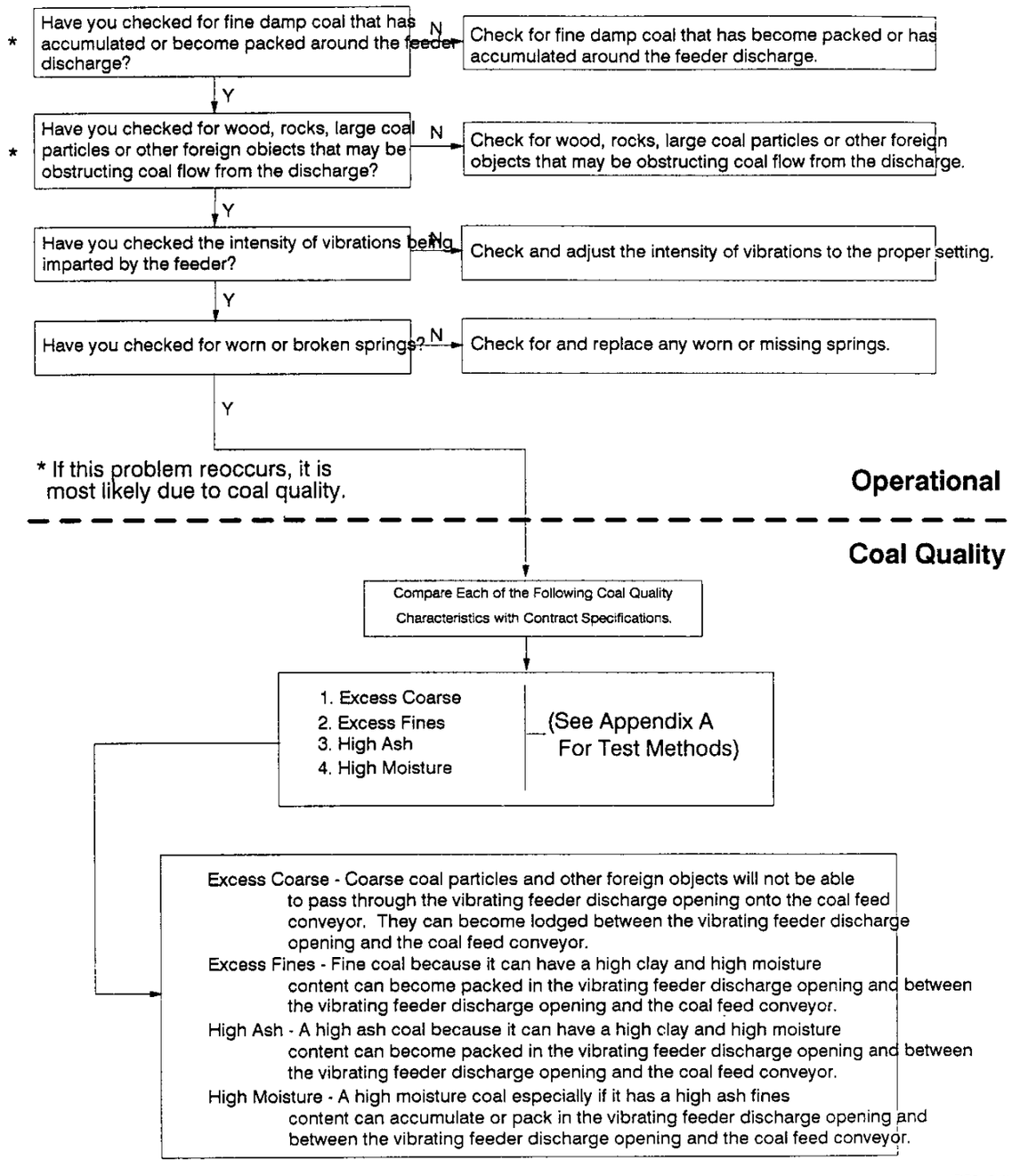


FIGURE 6-13: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim (Vibrating Feeder)

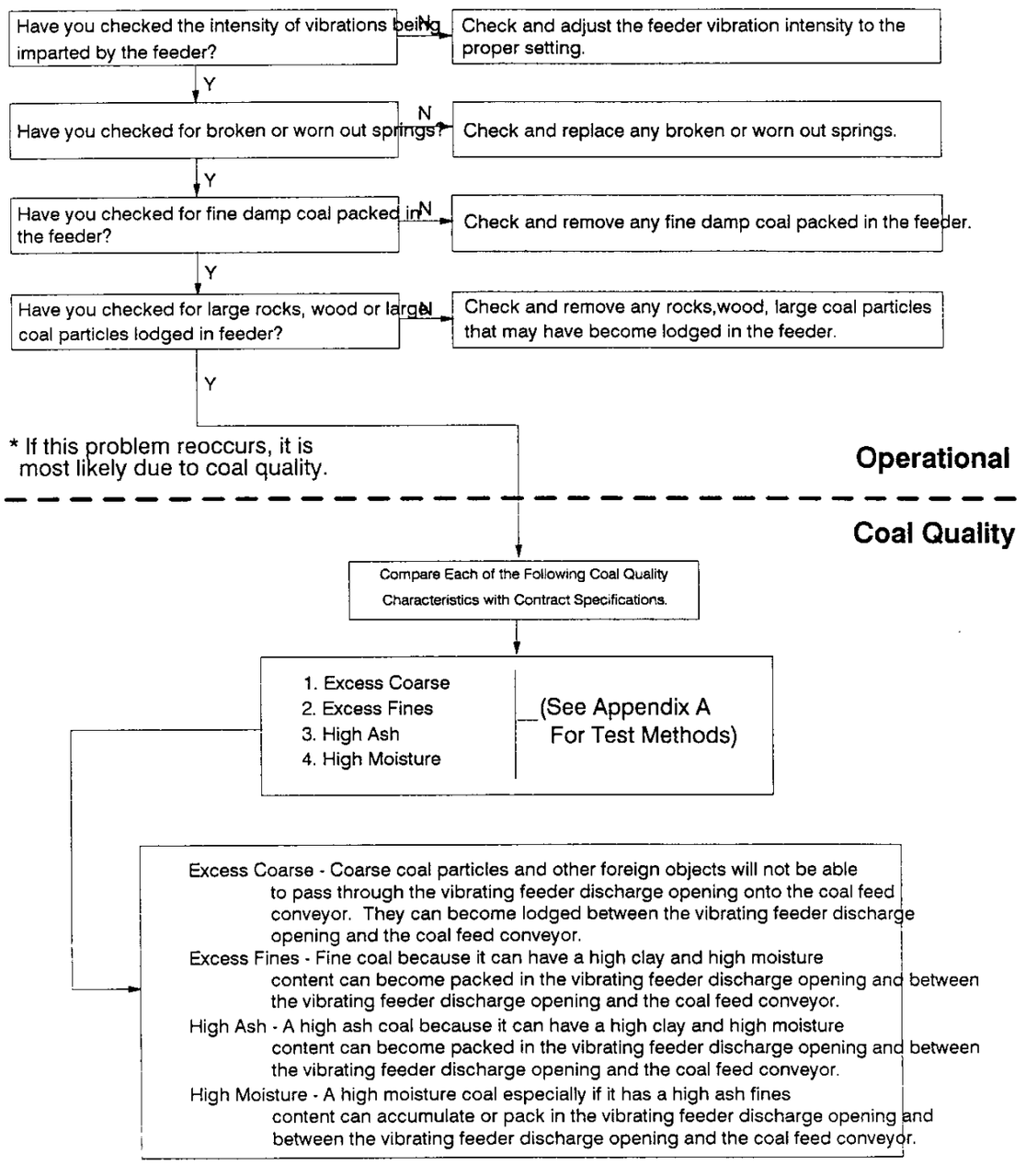


FIG6-13n/1

FIGURE 6-14: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Excess Wear Of The Automatic Coal Reclaim (Screw Feeder)

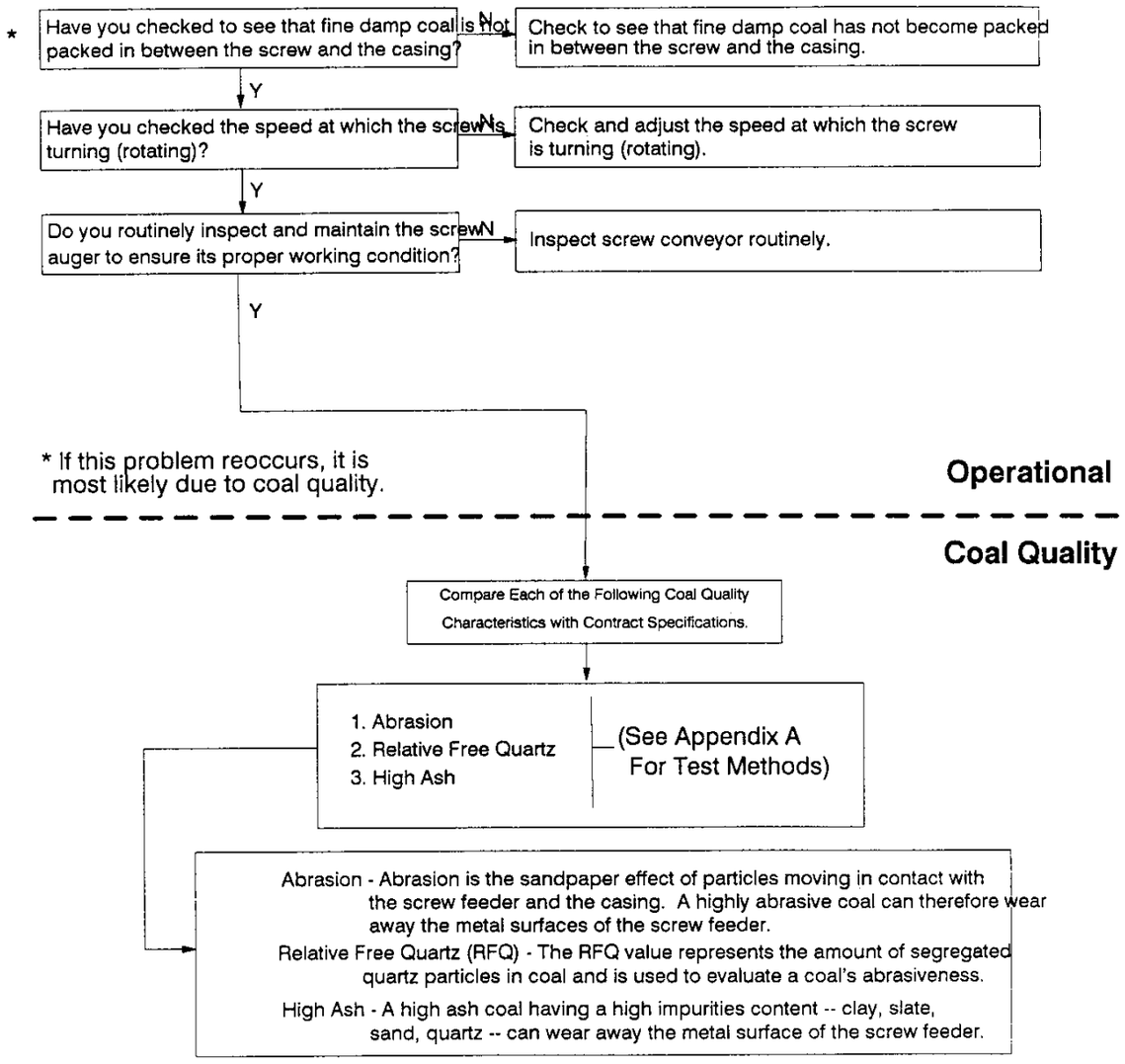


FIG6-14n/1

FIGURE 6-15: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Screw Feeder)

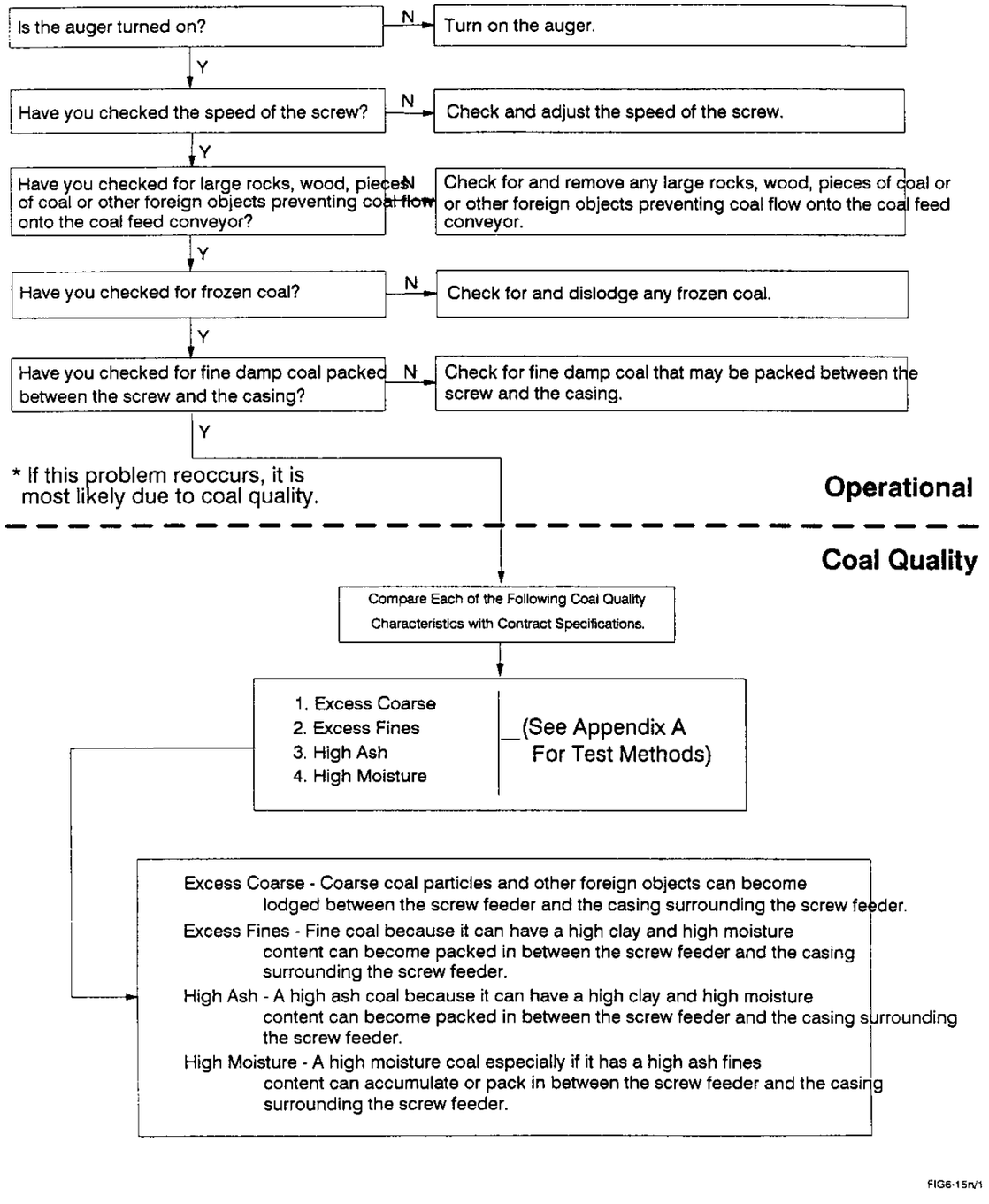


FIG6-15rV1

FIGURE 6-16: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim (Screw Feeder)

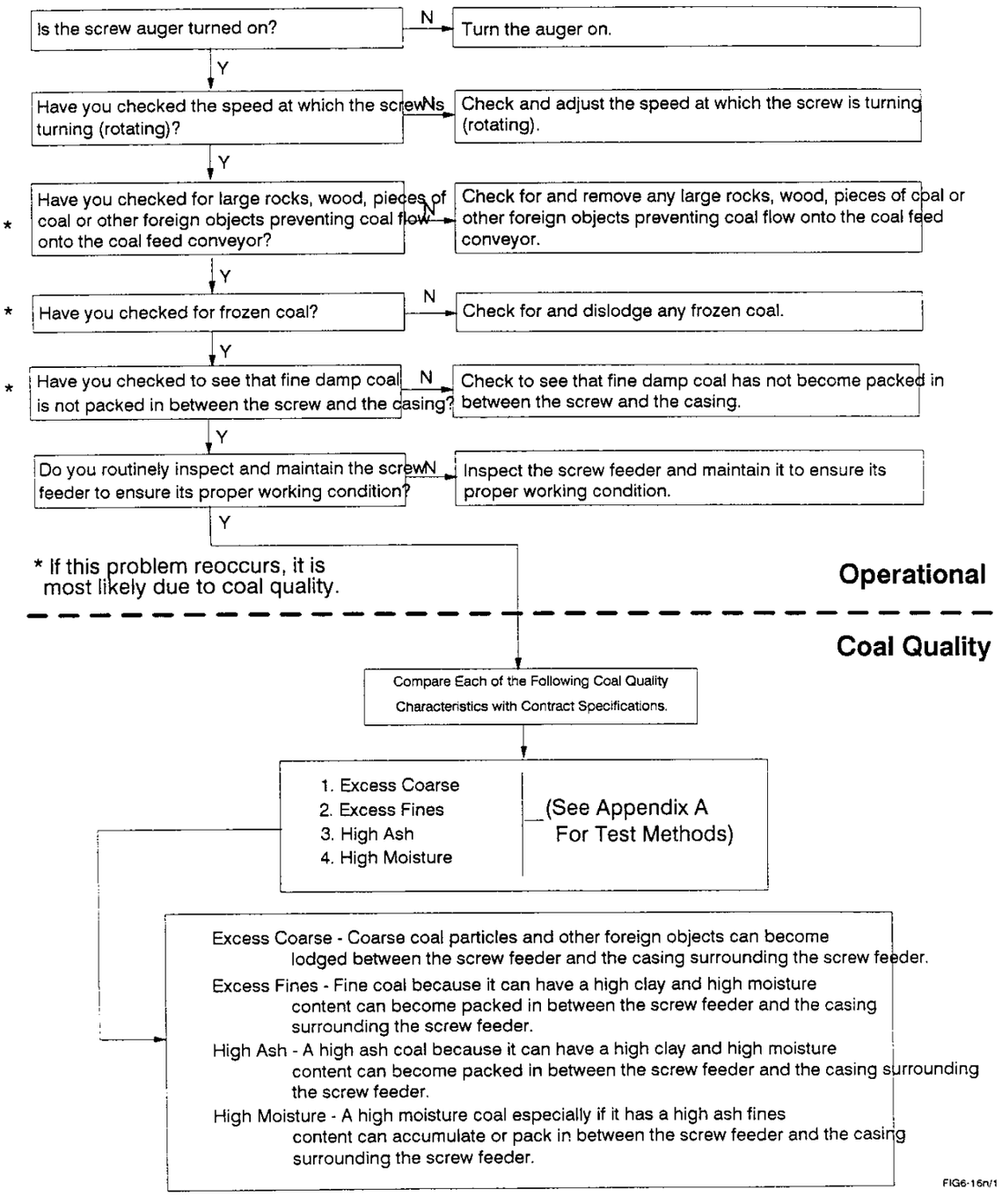


FIGURE 6-17: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim (Screw Feeder)

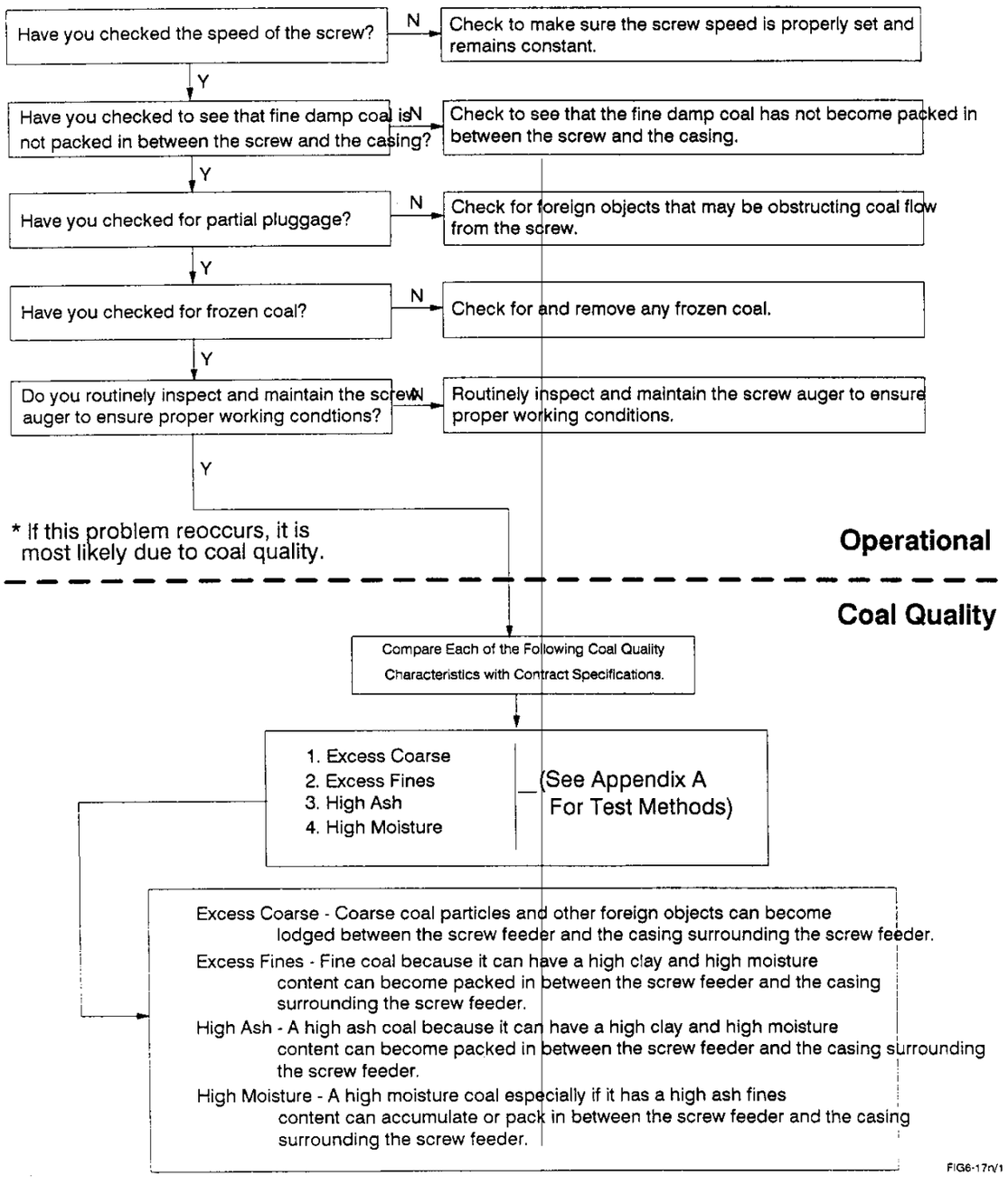


FIGURE 6-18: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Excess Wear Of The Automatic Coal Reclaim (Reciprocating Feeder)

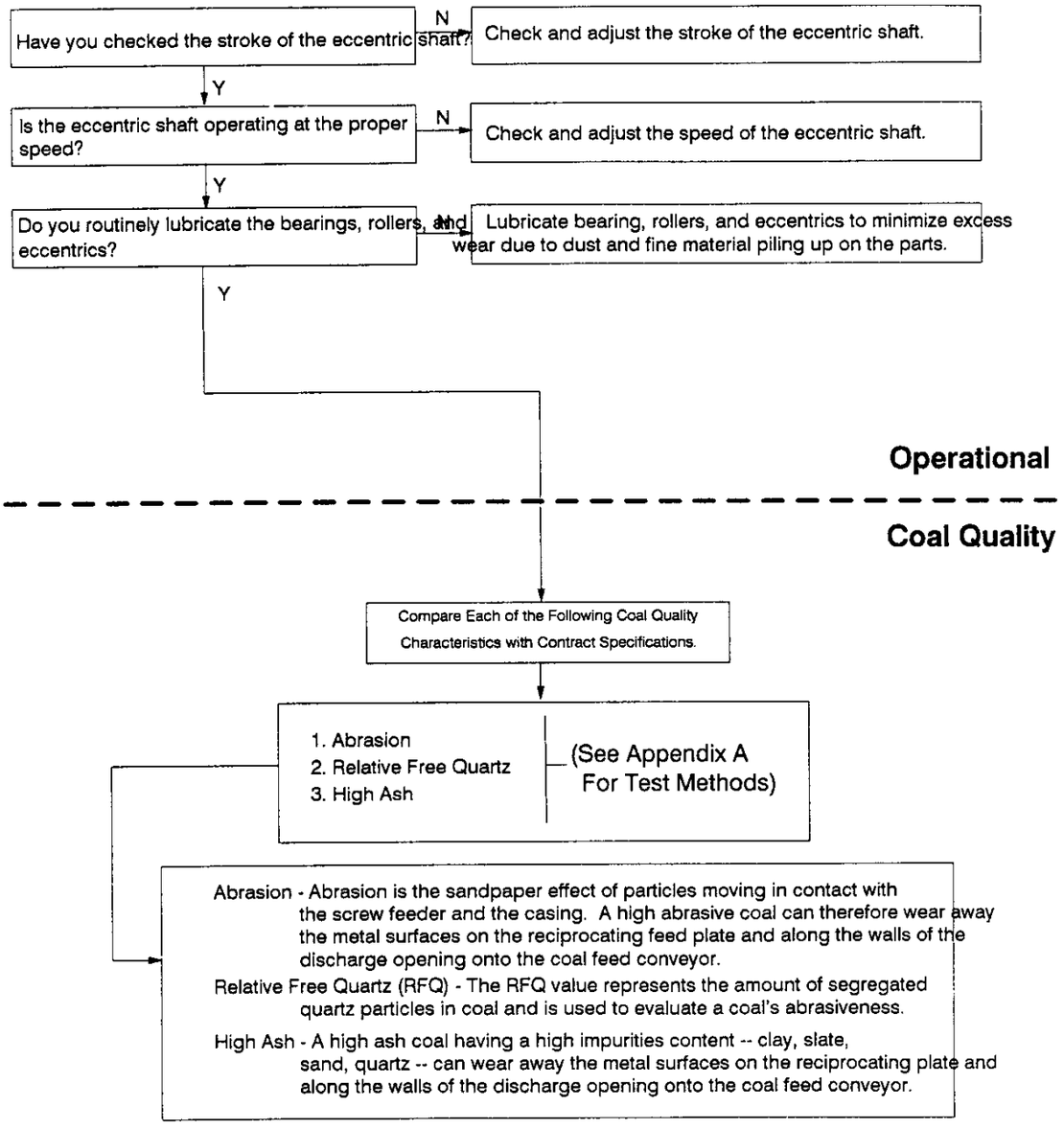


FIG6-18n/1

FIGURE 6-19: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Reciprocating Feeder)

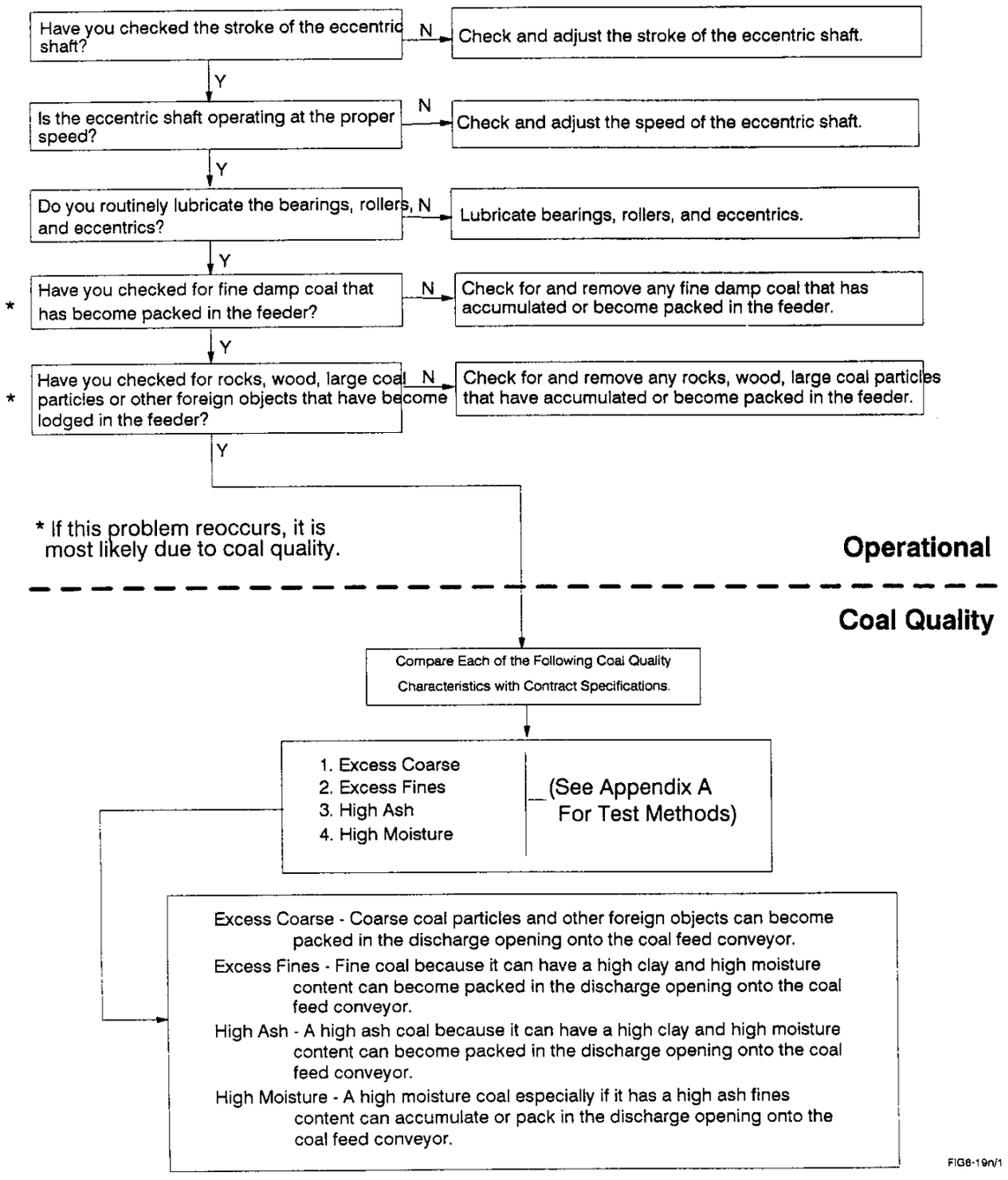


FIGURE 6-20: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim (Reciprocating Feeder)

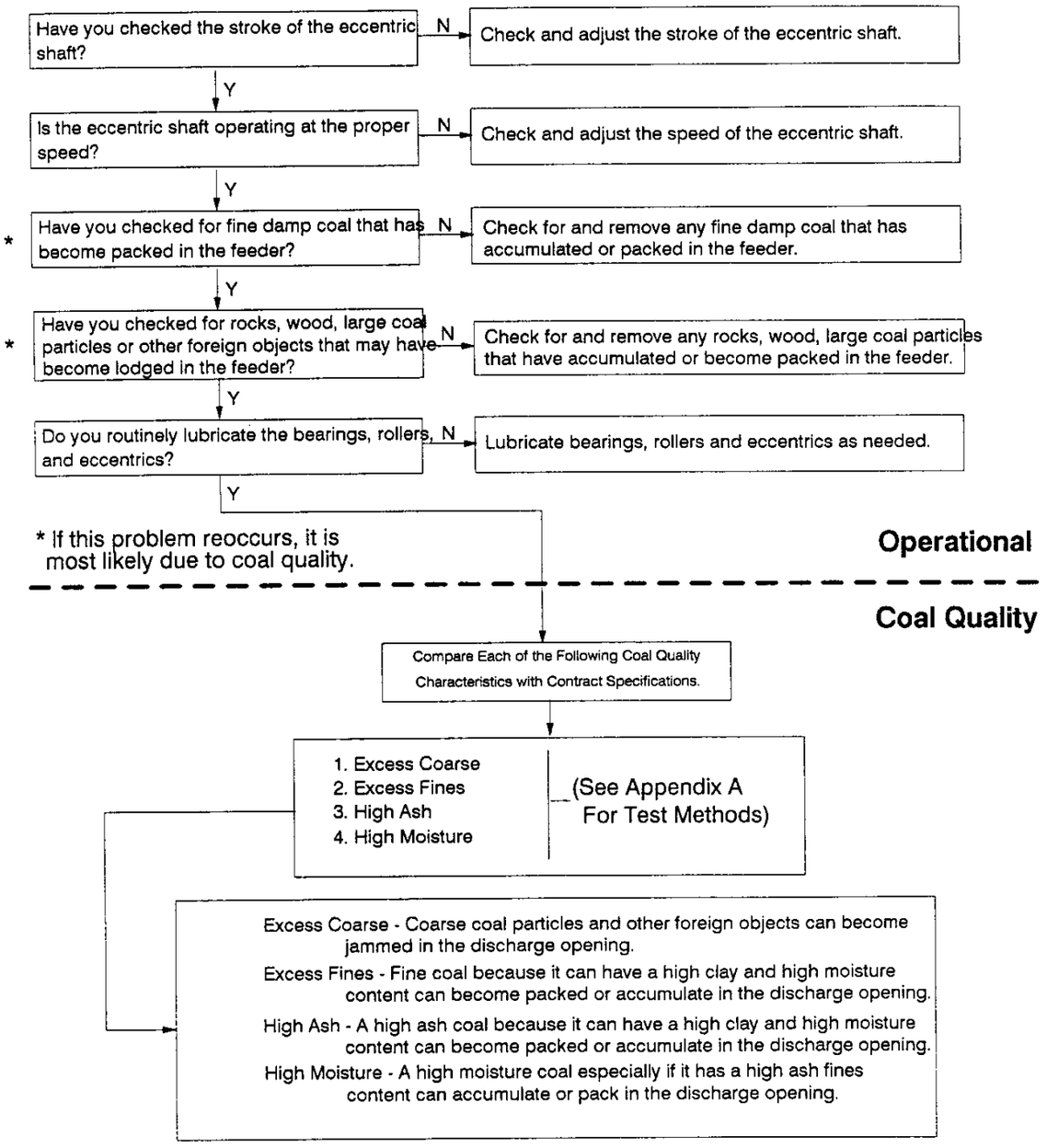


FIG6-20r/1

FIGURE 6-21: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim (Reciprocating Feeder)

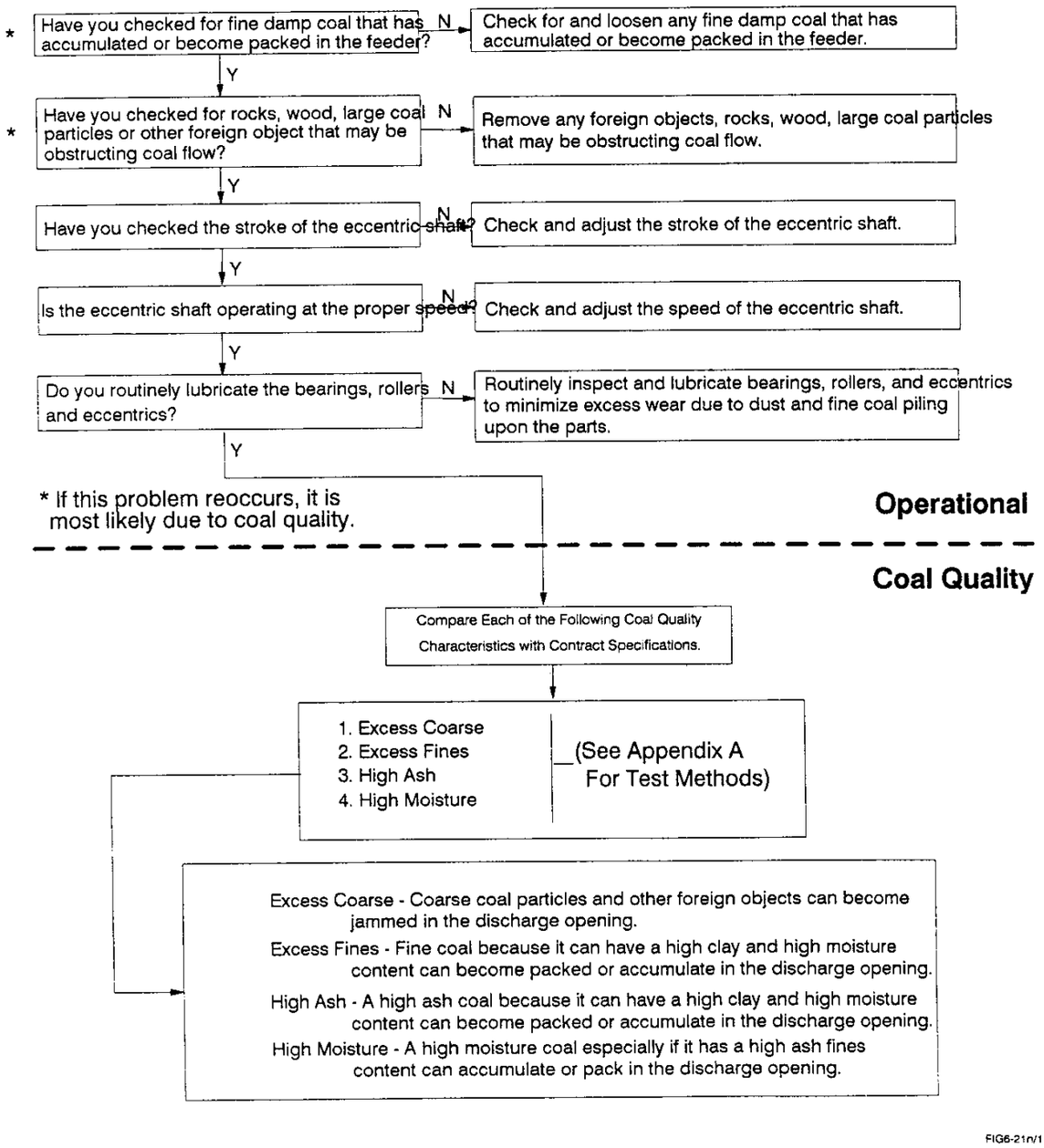


FIG6-21n/1

FIGURE 6-22: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM

For Excess Wear Of The Coal Feed Conveyor

(Belt Conveyor)

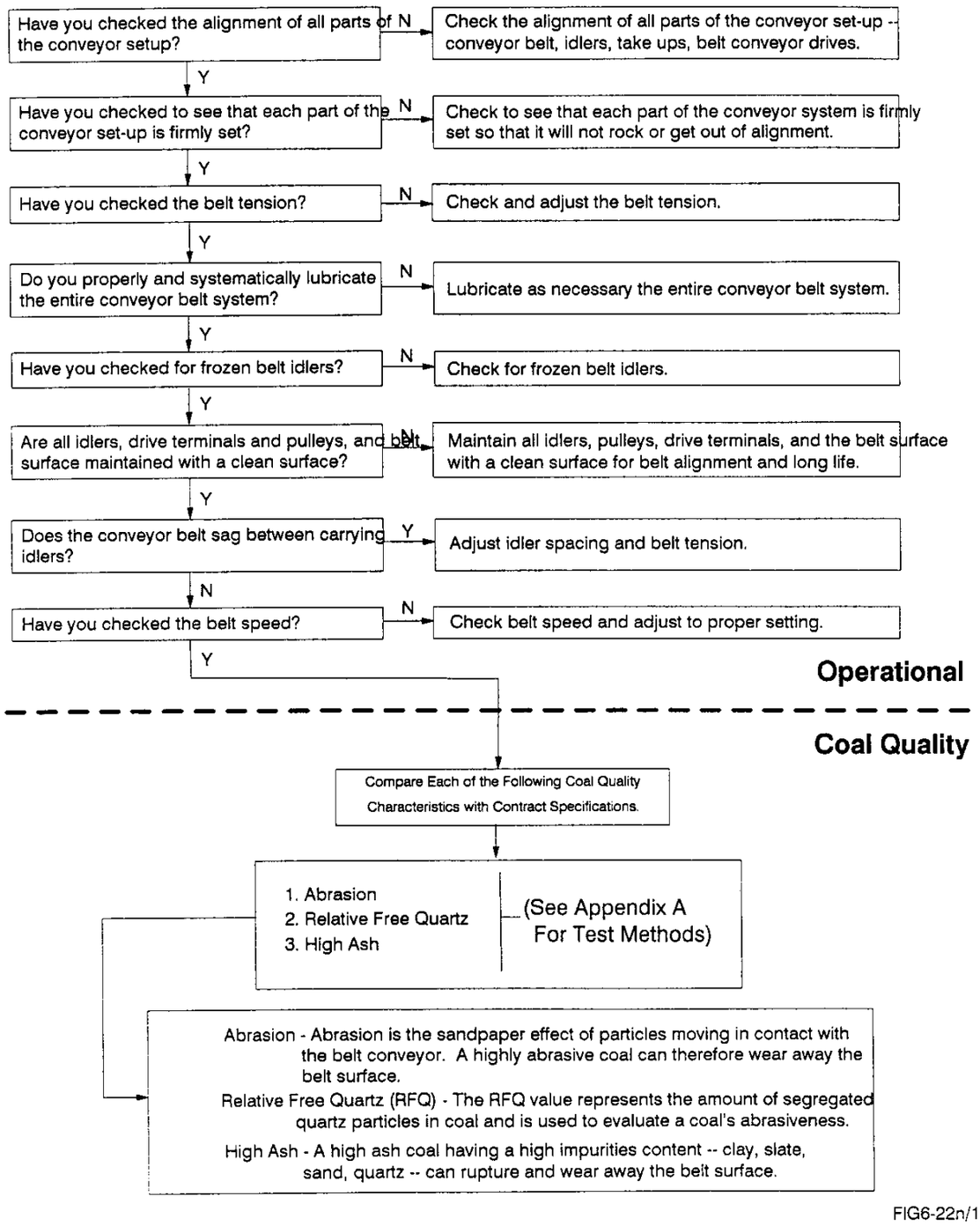


FIG6-22n/1

FIGURE 6-23: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Belt Conveyor)

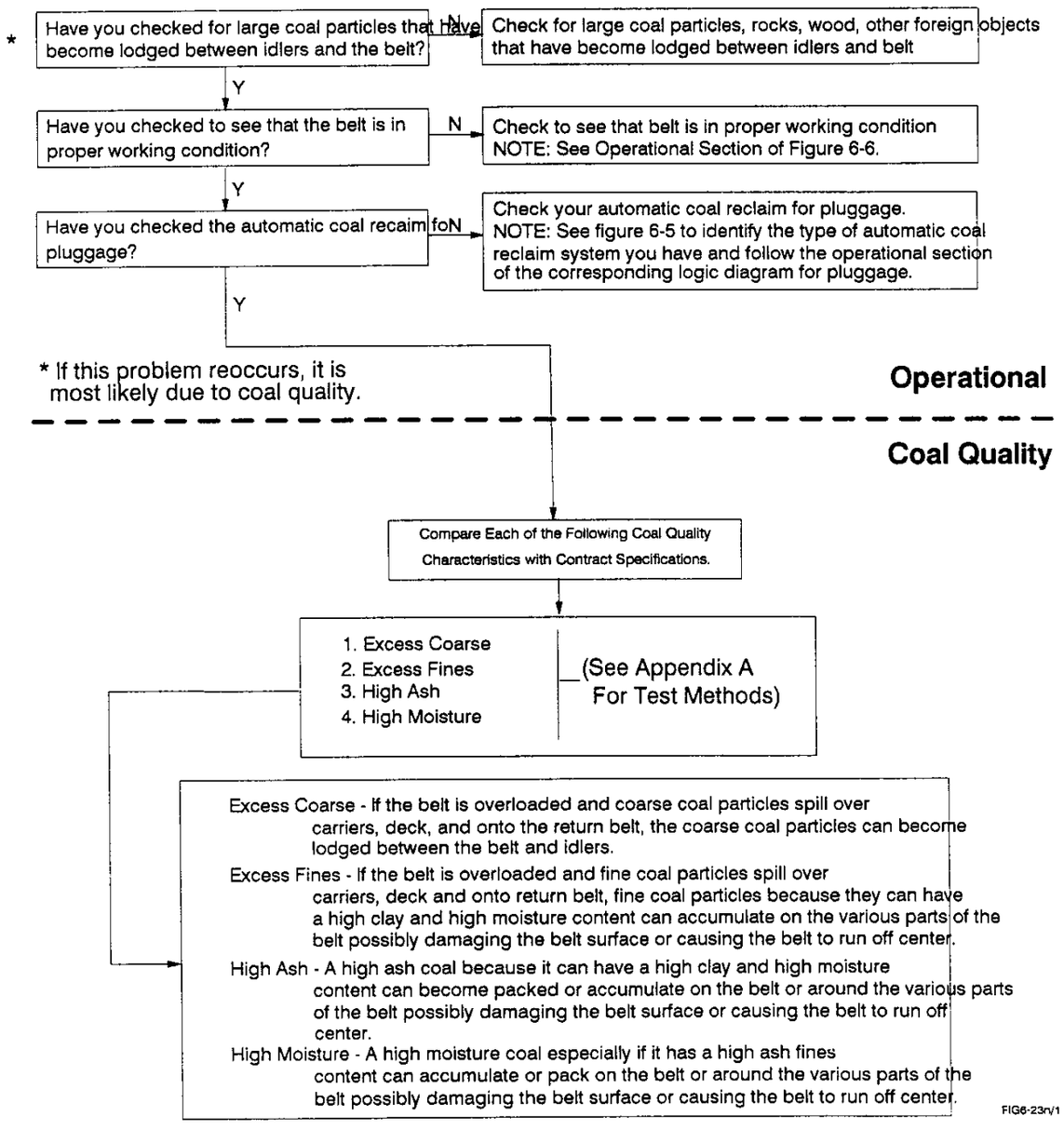


FIGURE 6-24: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Belt Conveyor)

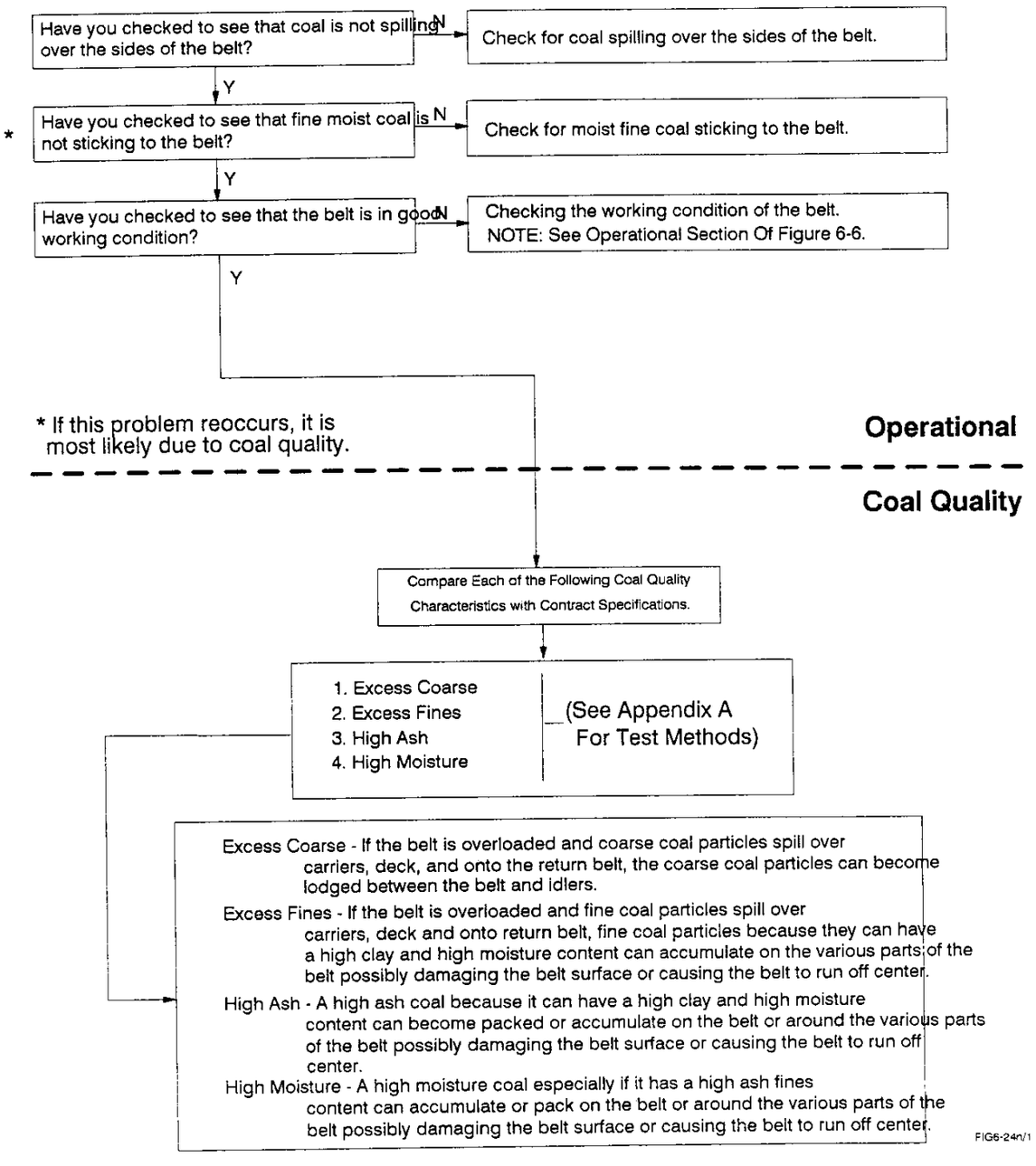


FIGURE 6-25: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Belt Conveyor)

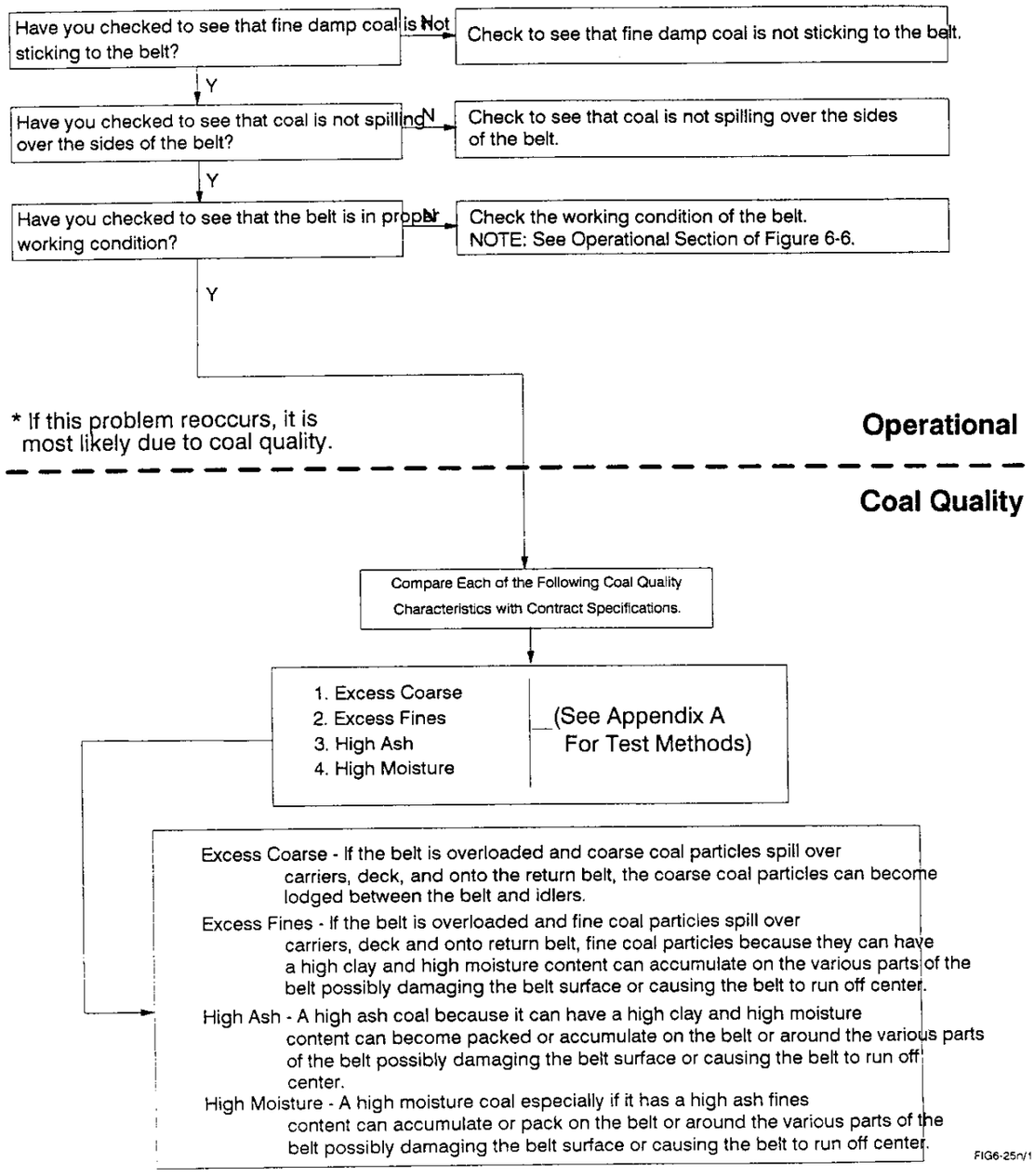


FIGURE 6-26: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear In The Coal Feed Conveyor
(Screw Conveyor)

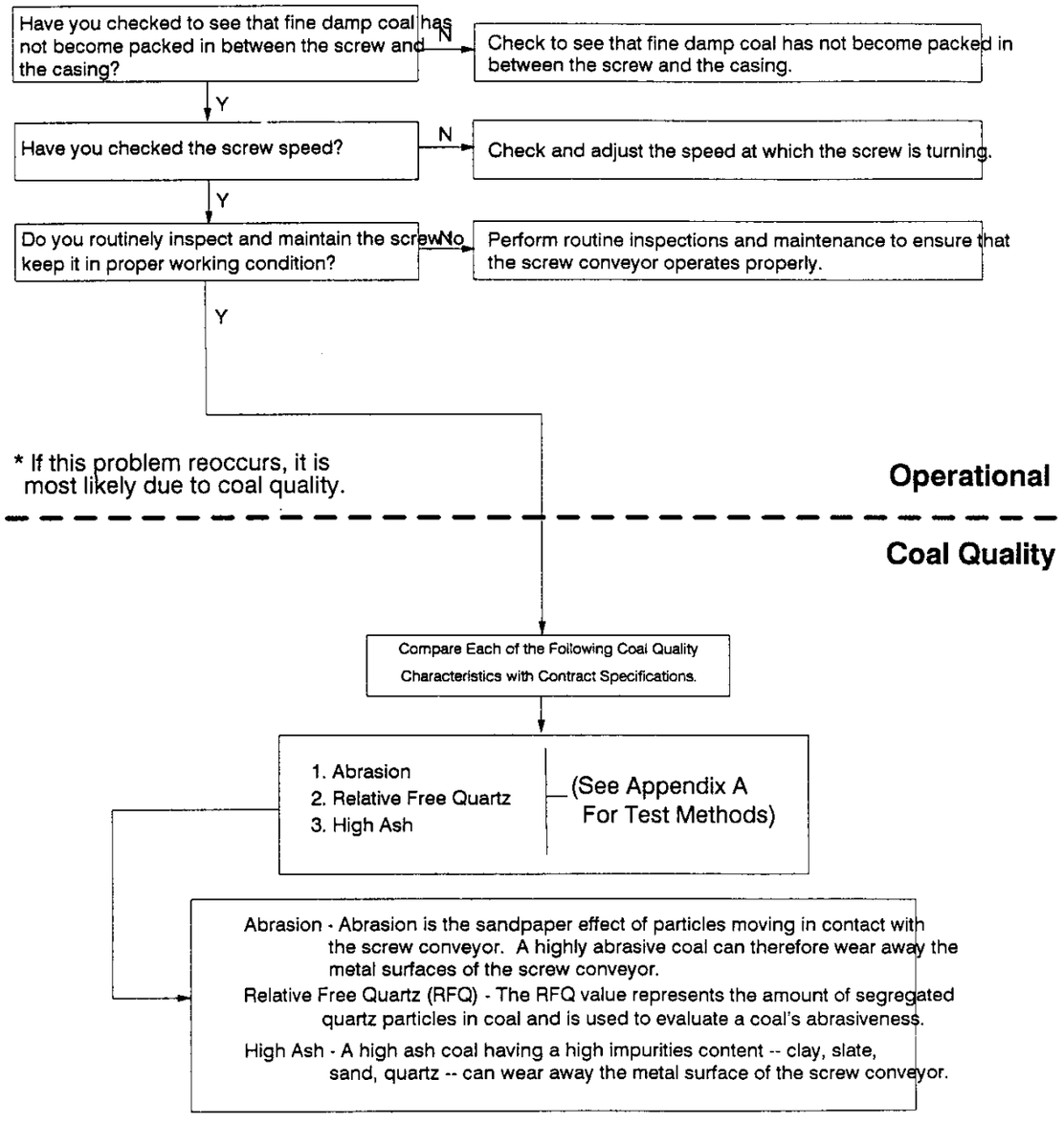


FIG6-26n/1

FIGURE 6-27: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Screw Conveyor)

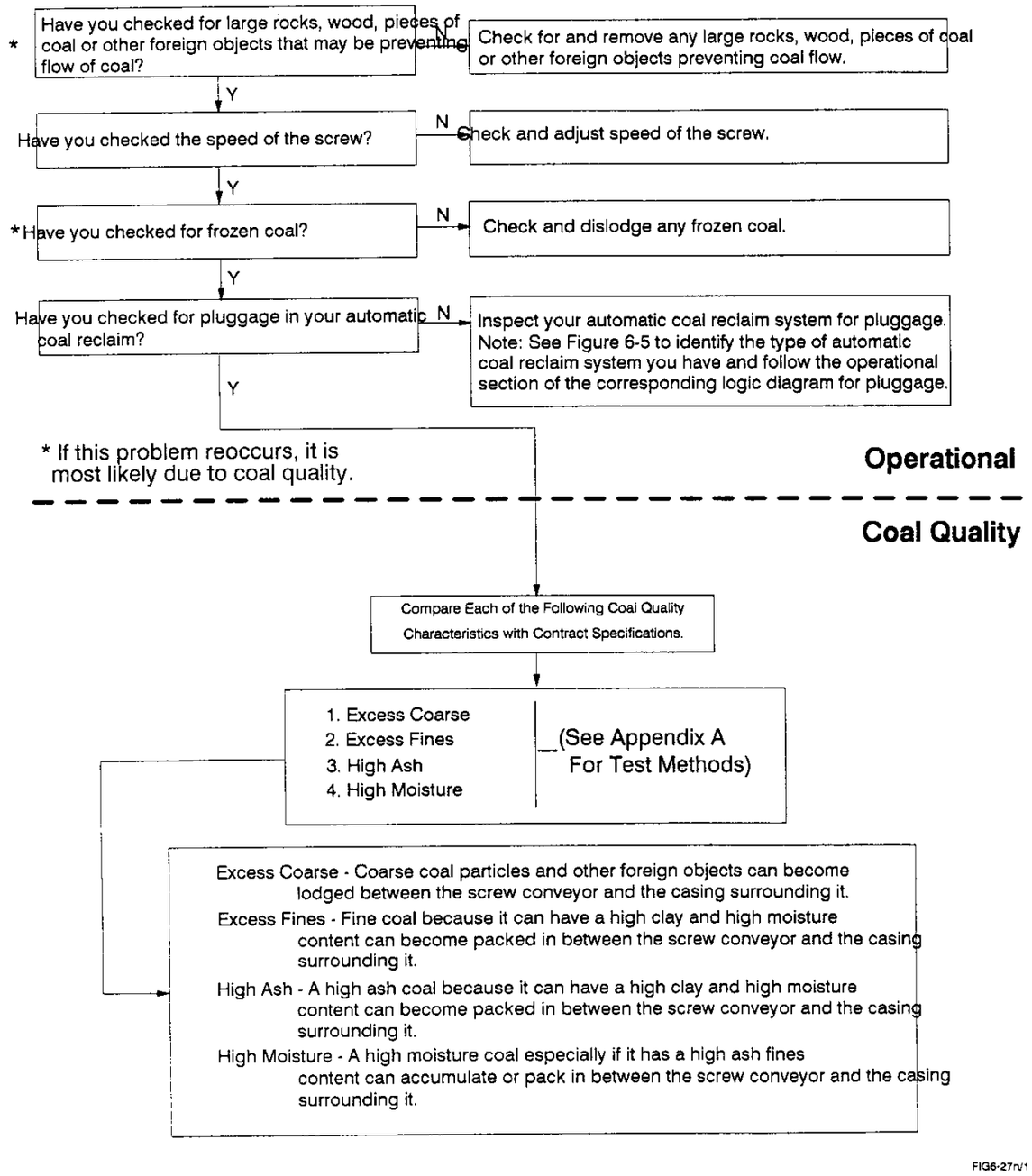


FIG6-27n/1

FIGURE 6-28: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Screw Conveyor)

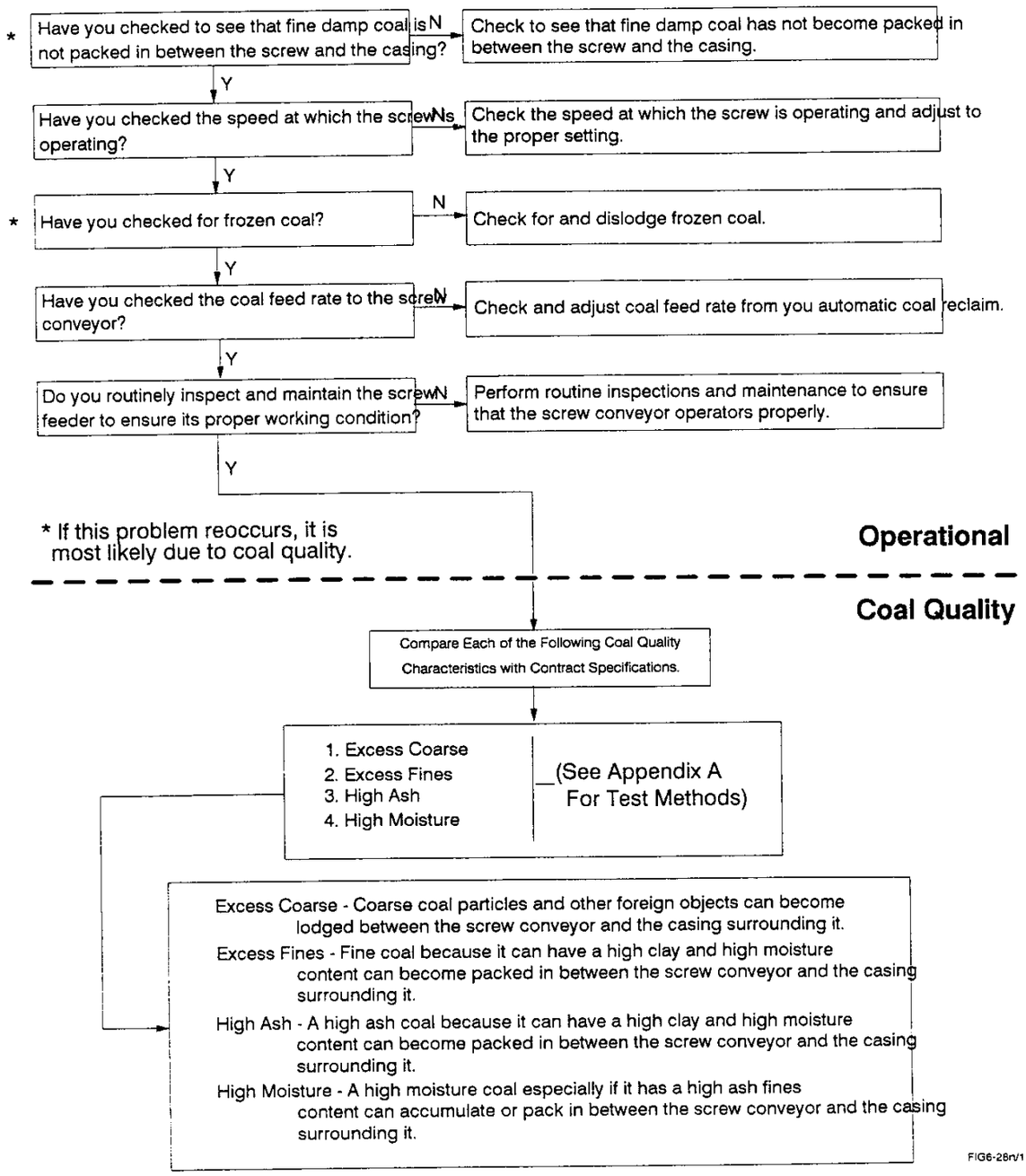


FIGURE 6-29: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Screw Conveyor)

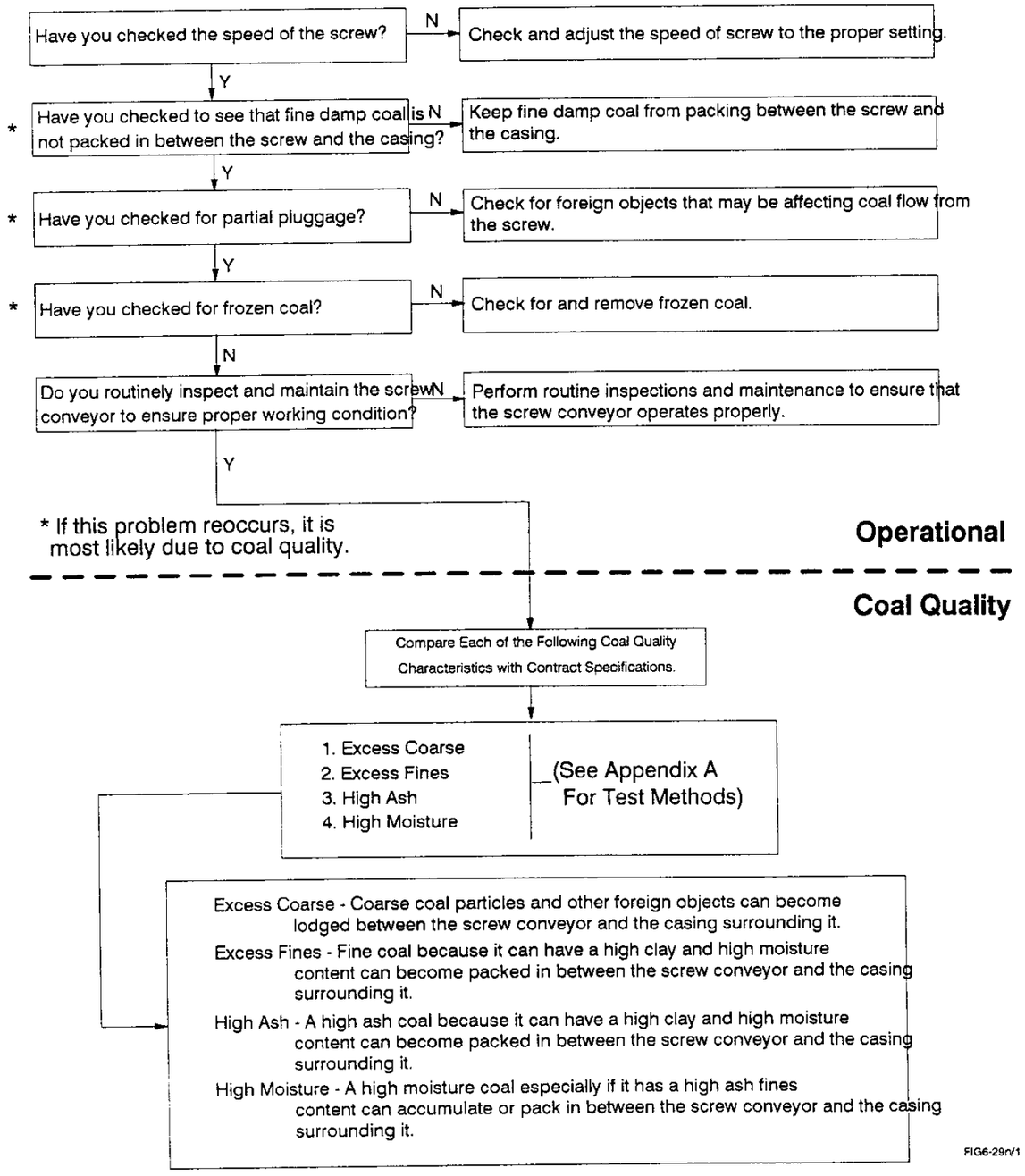


FIGURE 6-30: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Excess Wear In The Coal Feed Conveyor (Bucket Conveyor)

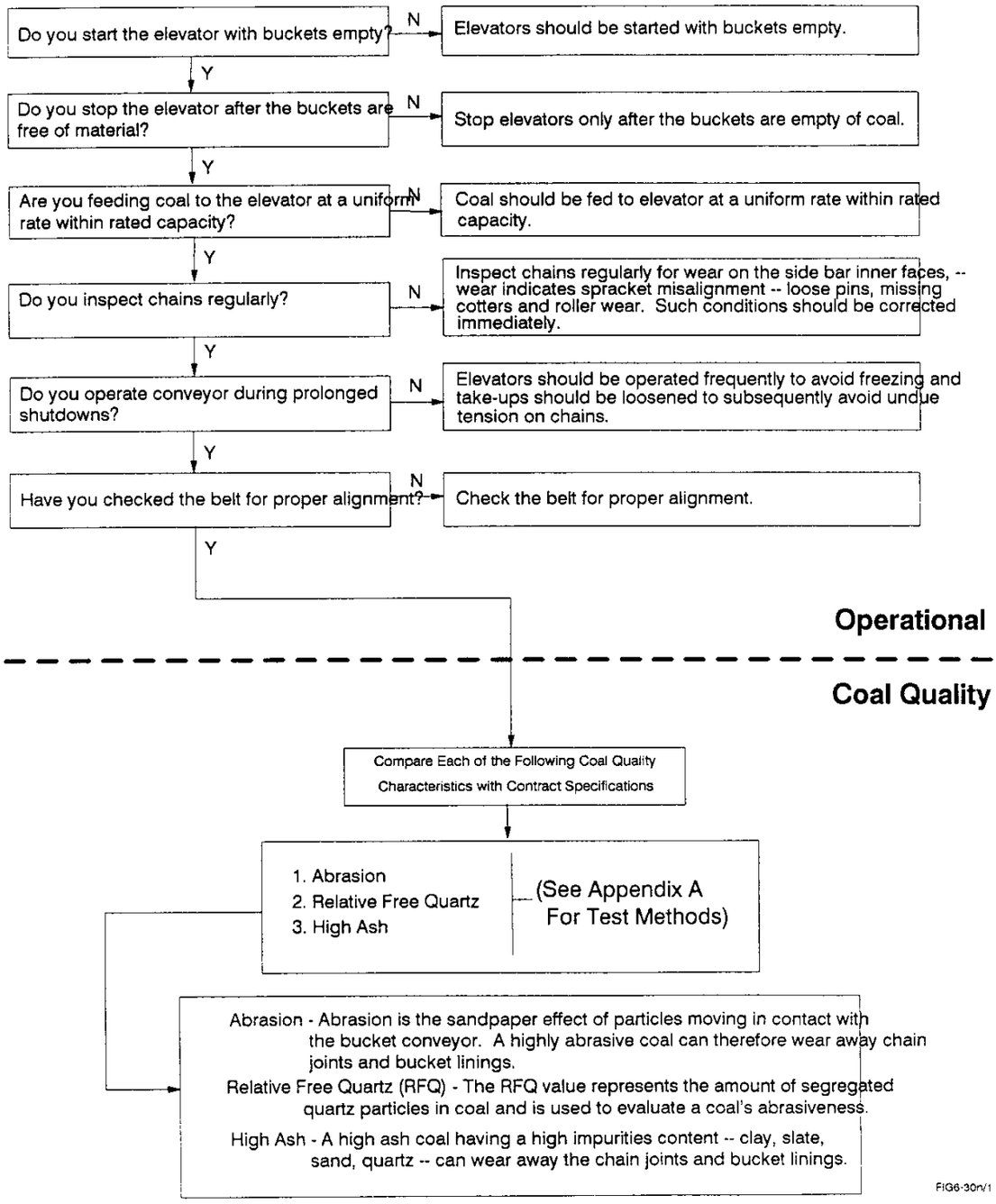


FIGURE 6-31: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Bucket Conveyor)

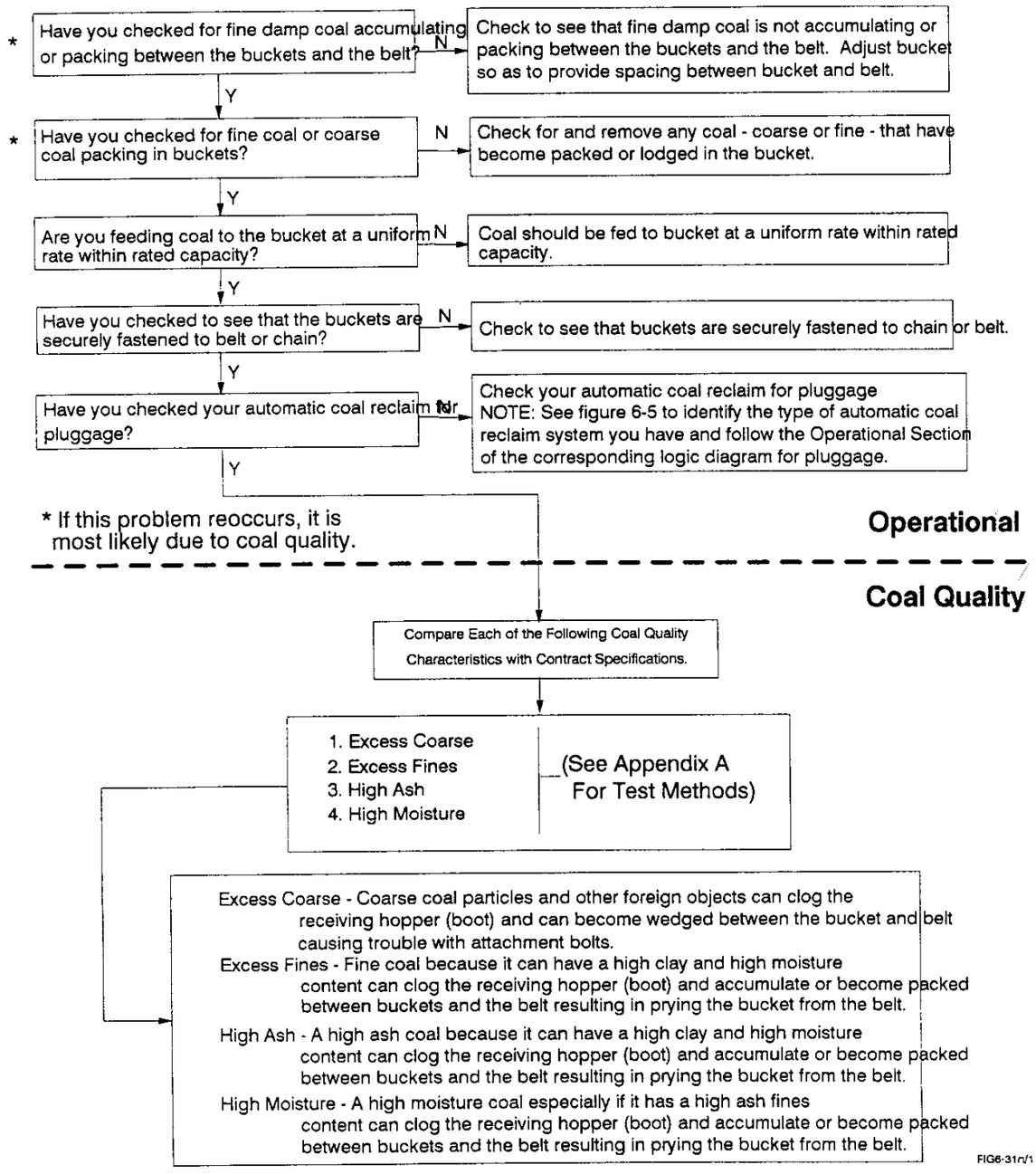


FIGURE 6-32: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Bucket Conveyor)

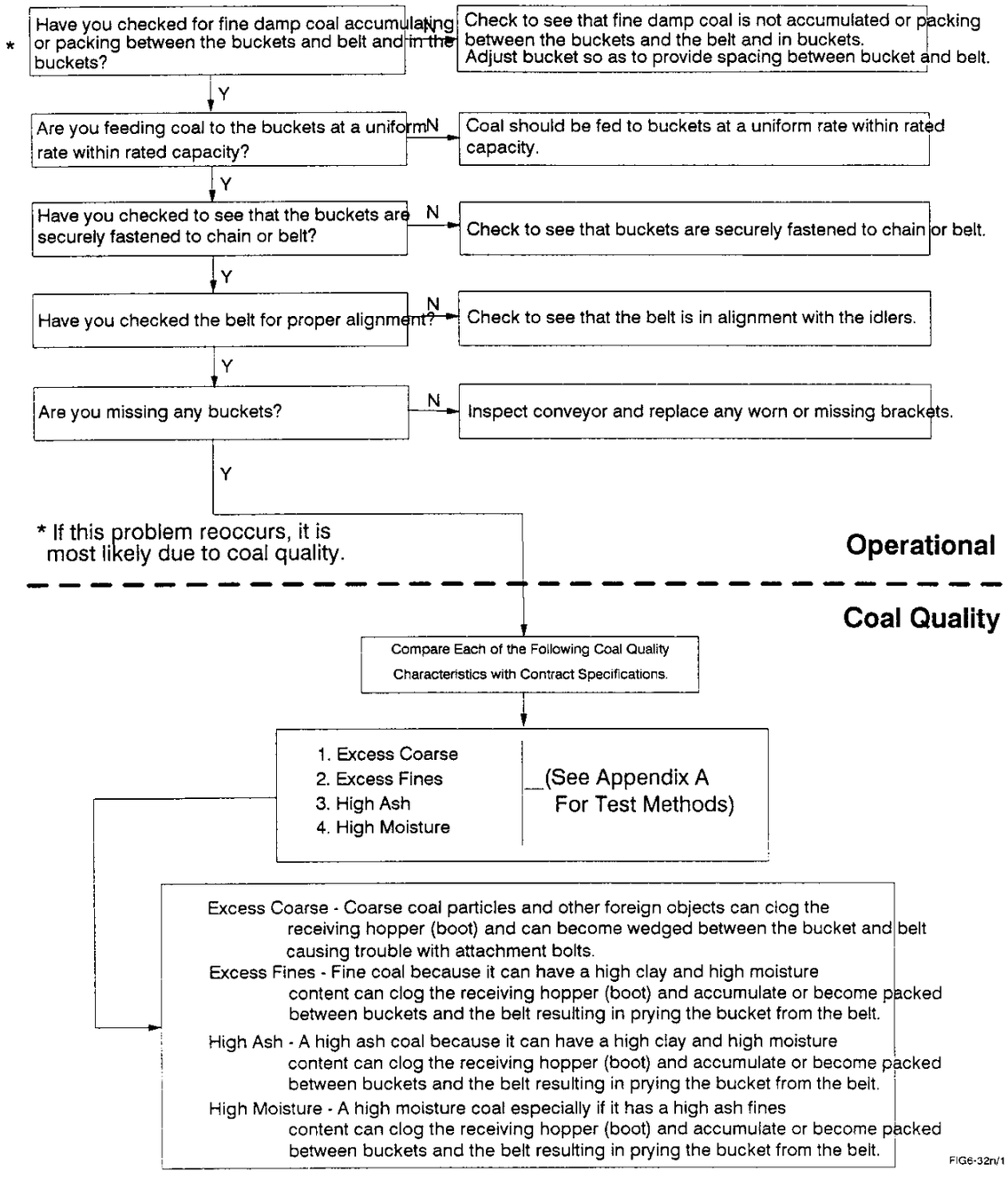


FIGURE 6-33: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM

Erratic Feeding From The Coal Feed Conveyor (Bucket Conveyor)

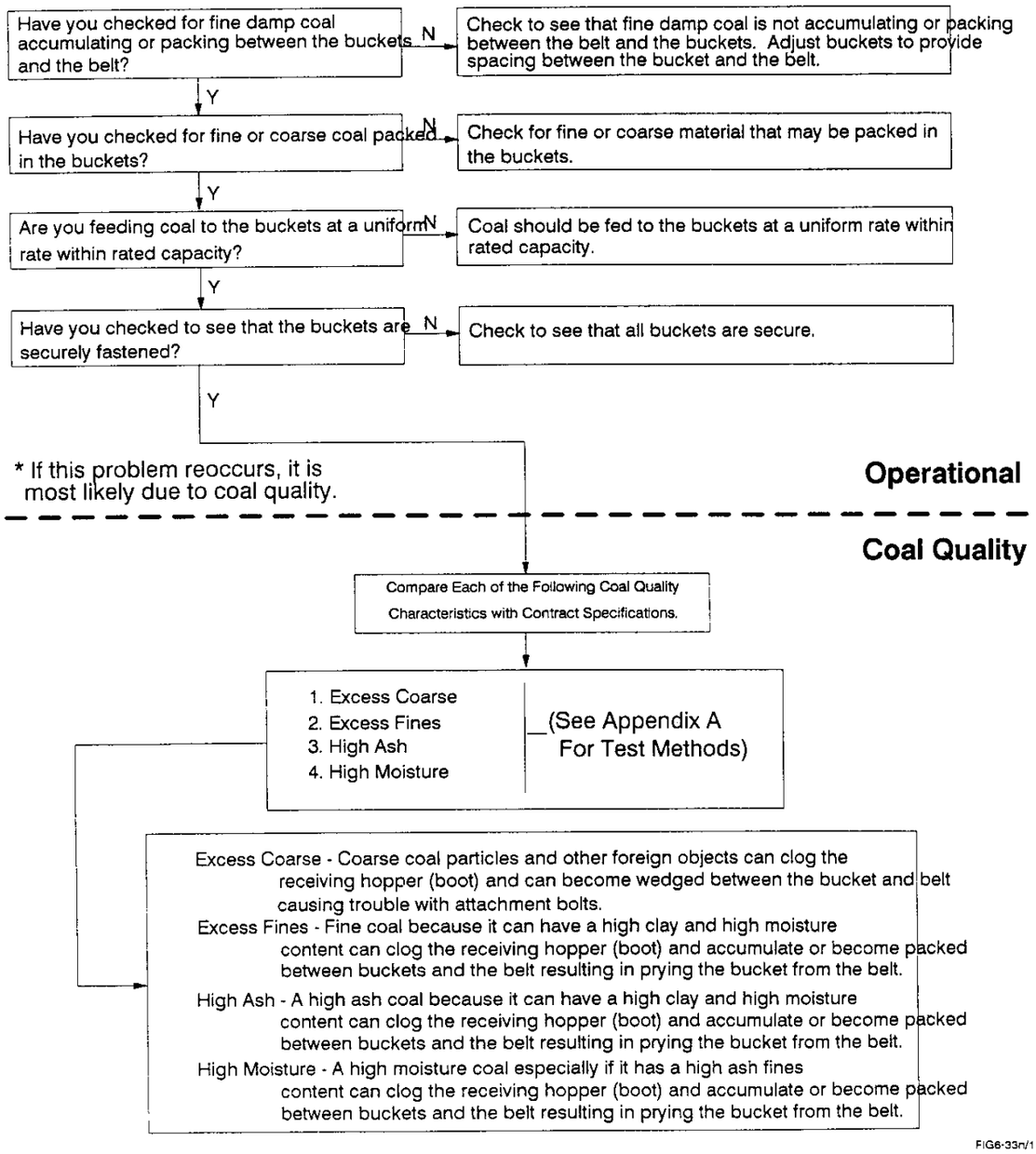


FIGURE 6-34: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Coal Feed Conveyor
(Redler Conveyor)

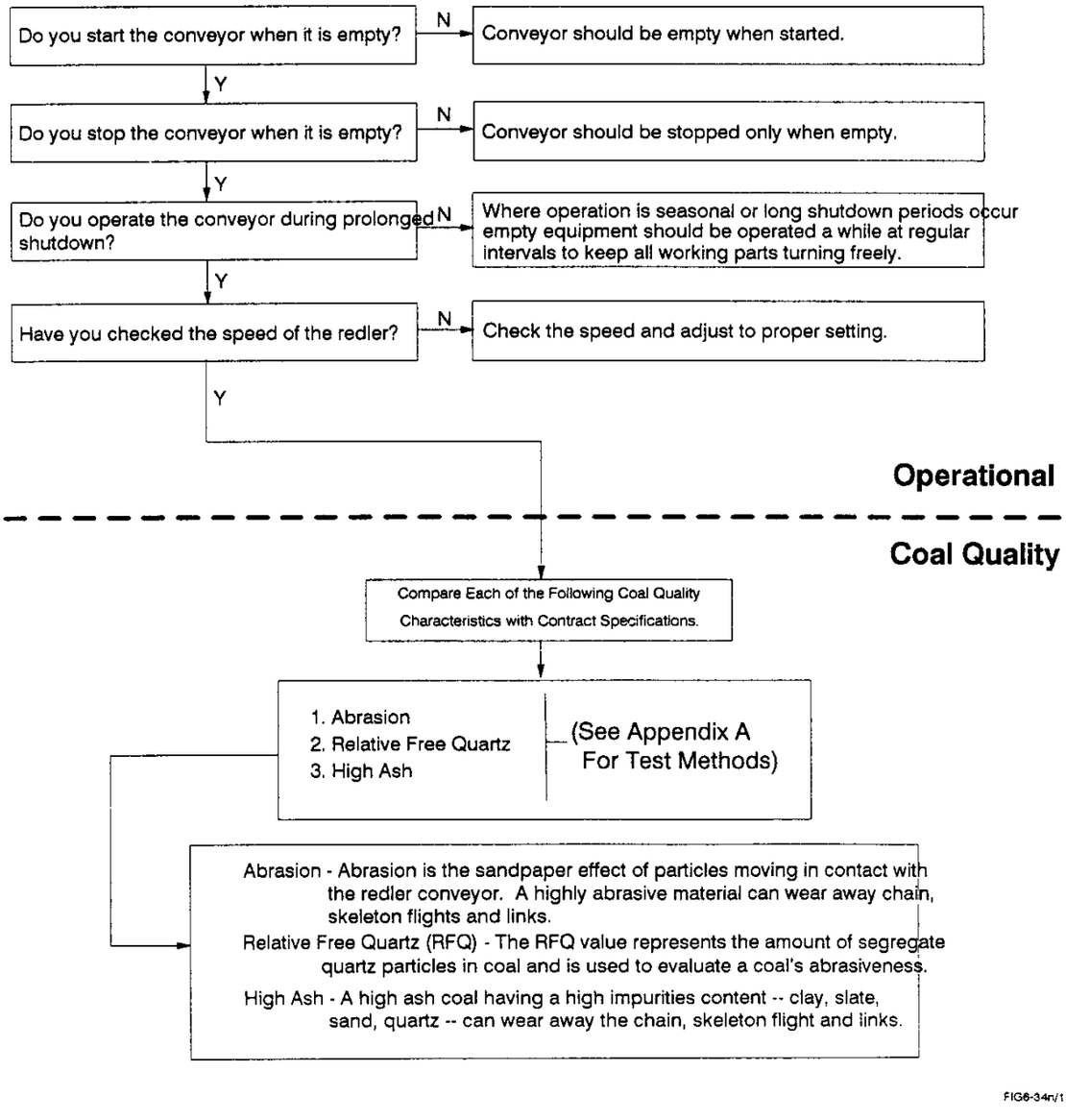


FIG6-34n/1

FIGURE 6-35: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Redler Conveyor)

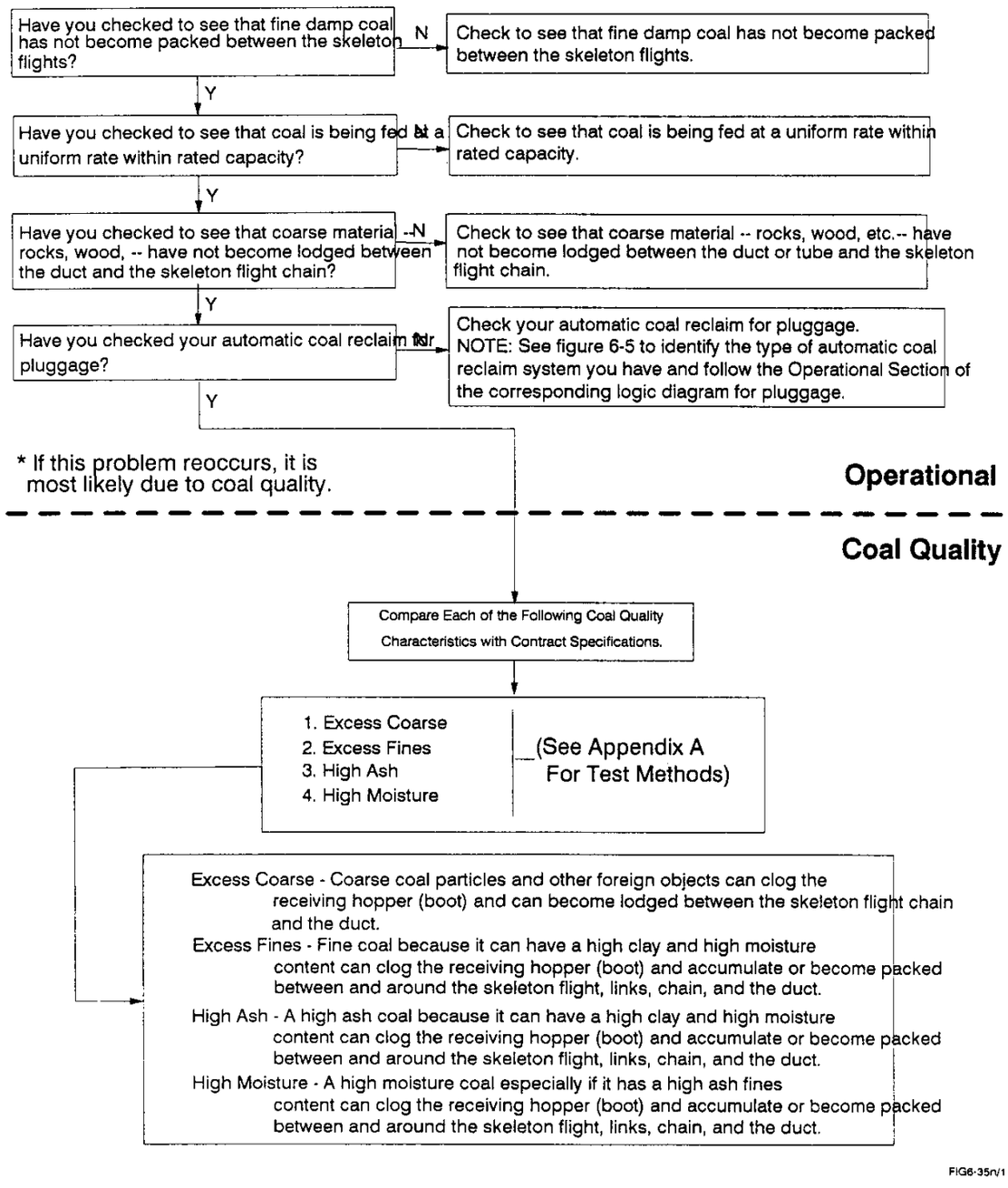


FIG6-35n/1

FIGURE 6-36: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Coal Feed Conveyor
(Redler Conveyor)

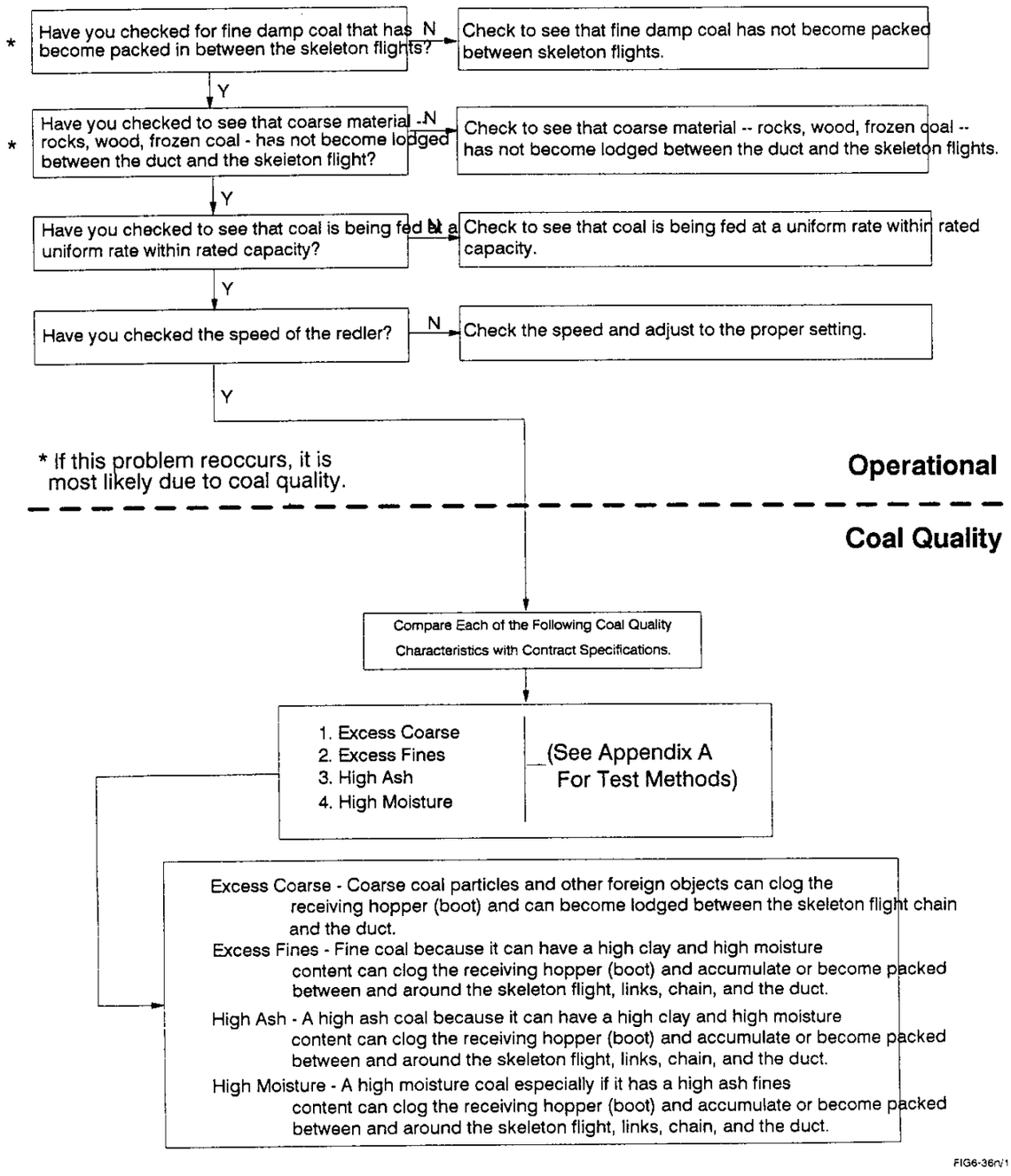


FIGURE 6-37: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Redler Conveyor)

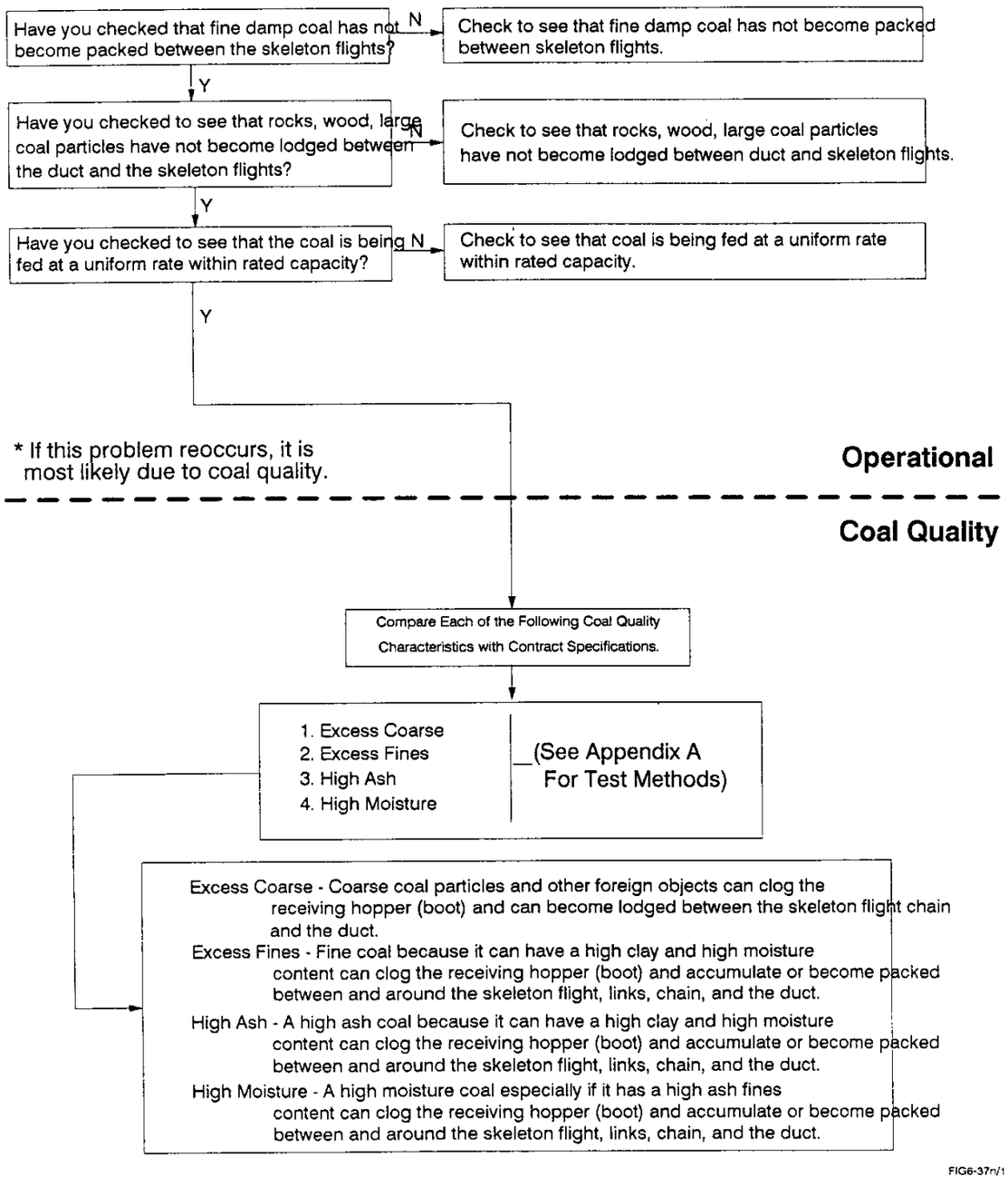


FIGURE 6-38: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Chute)

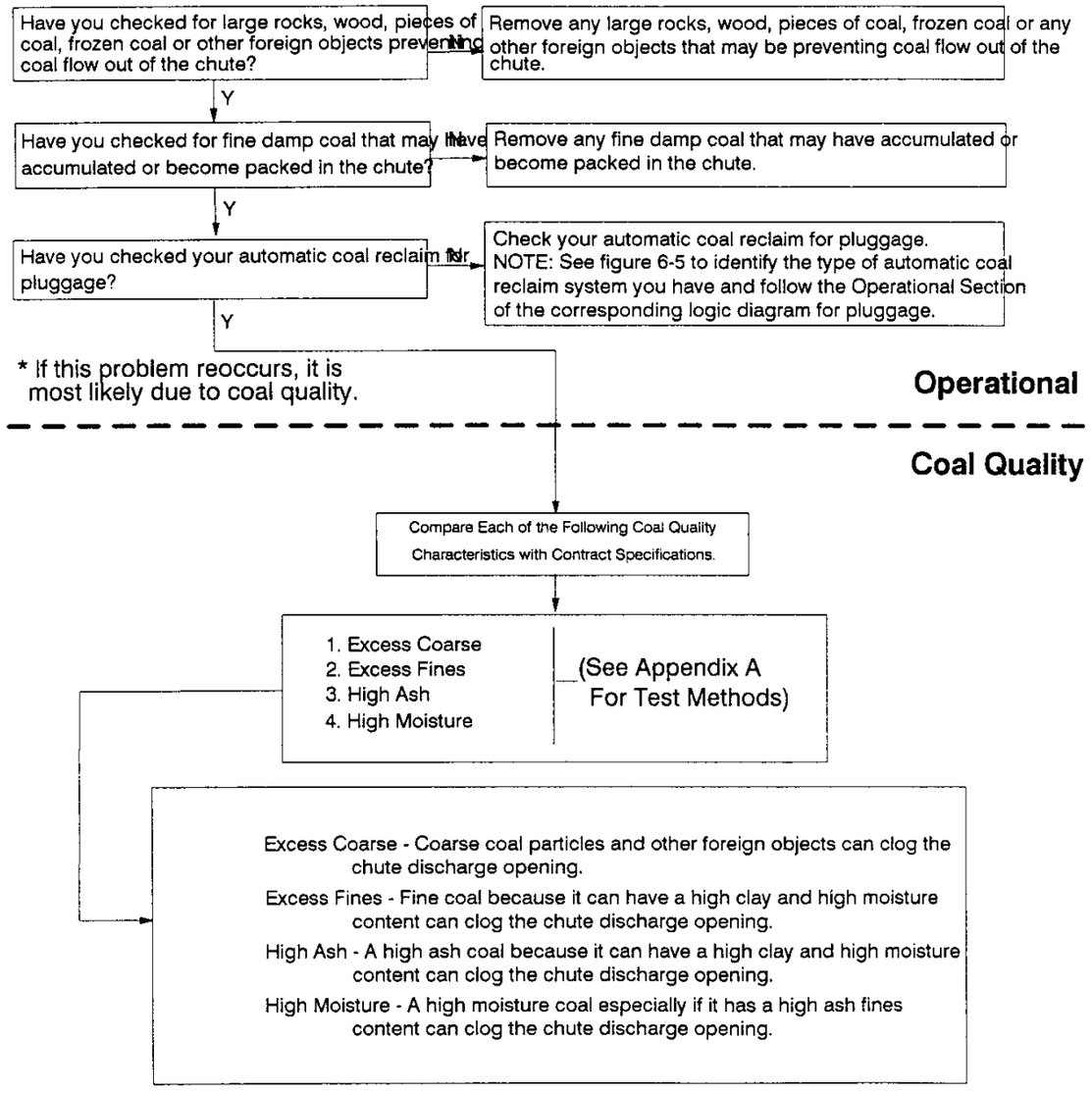


FIG6-38n/1

FIGURE 6-39: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Insufficient Capacity In The Coal Feed Conveyor (Chute)

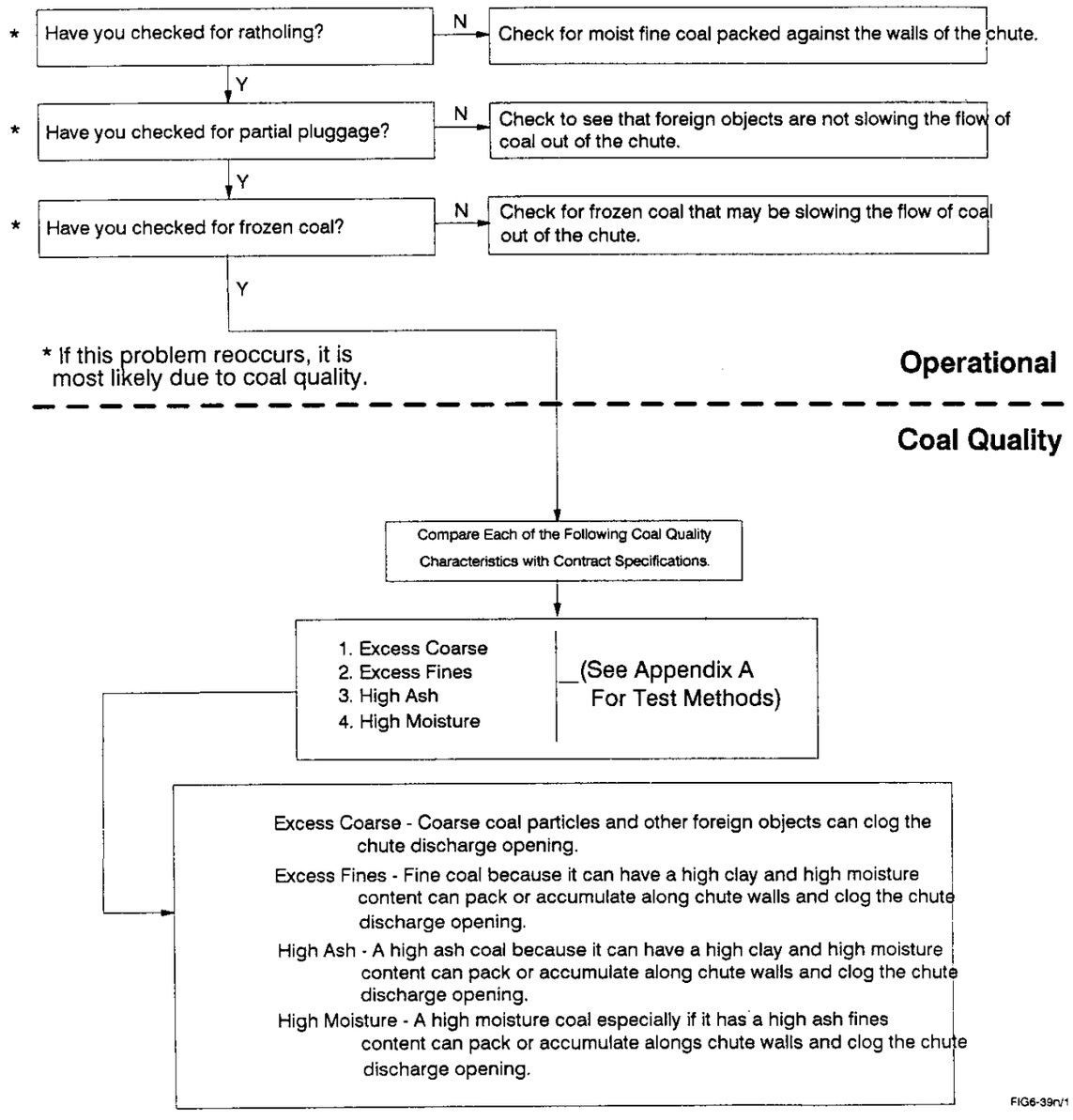


FIGURE 6-40: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor (Chute)

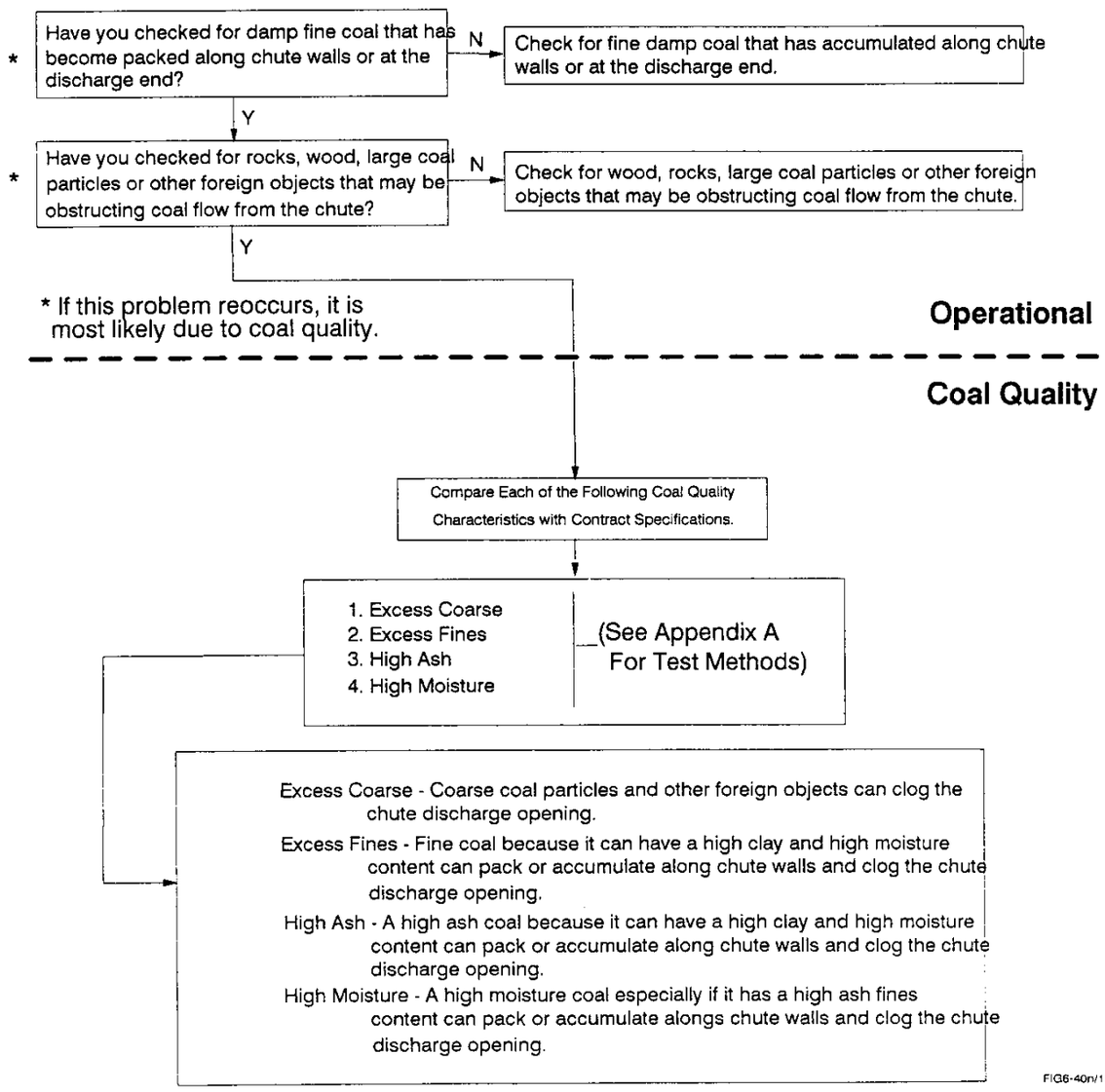


FIGURE 6-41: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feeders
(Chute)

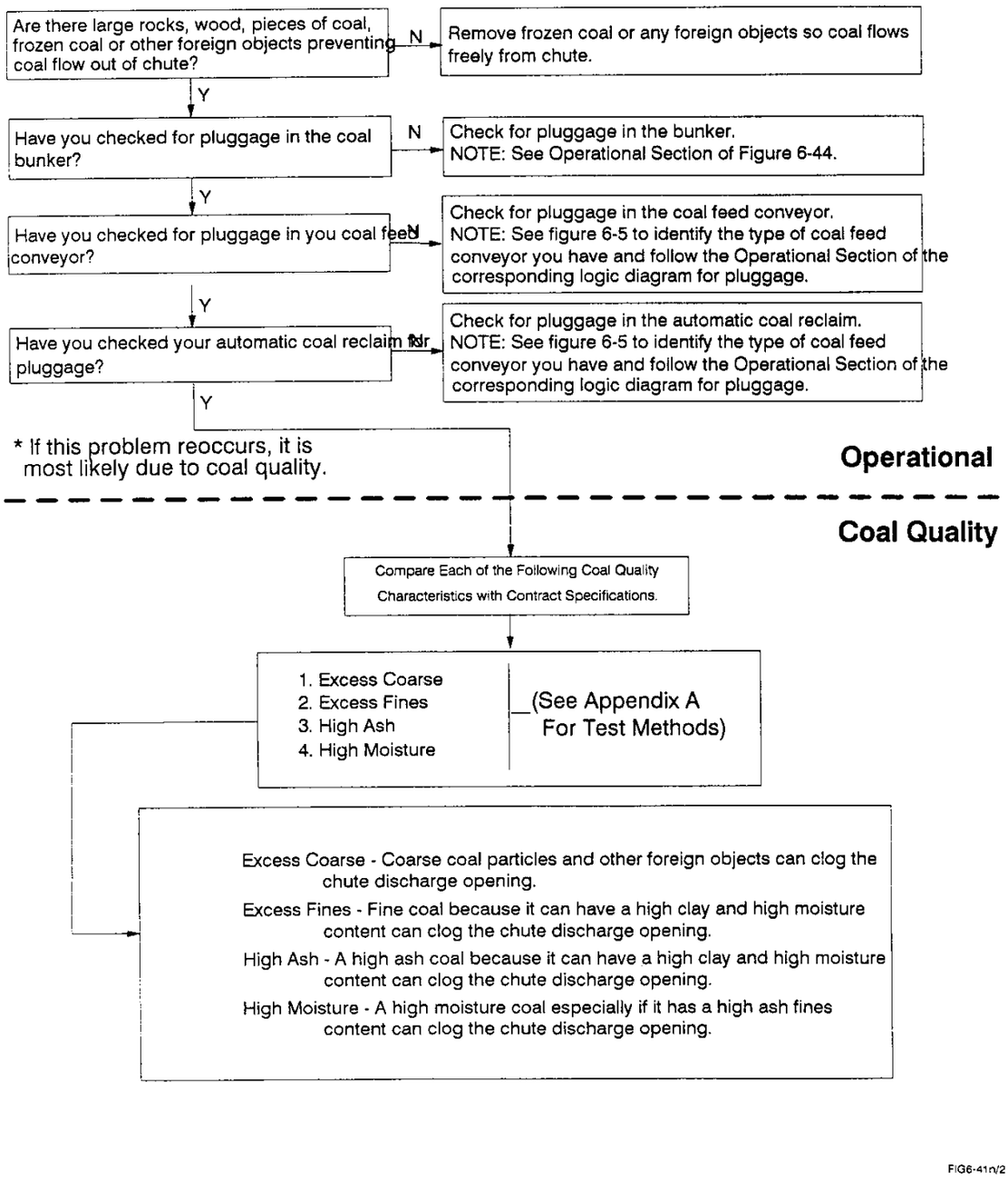


FIG6-41n/2

FIGURE 6-42: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In the Coal Feeder
(Chutes)

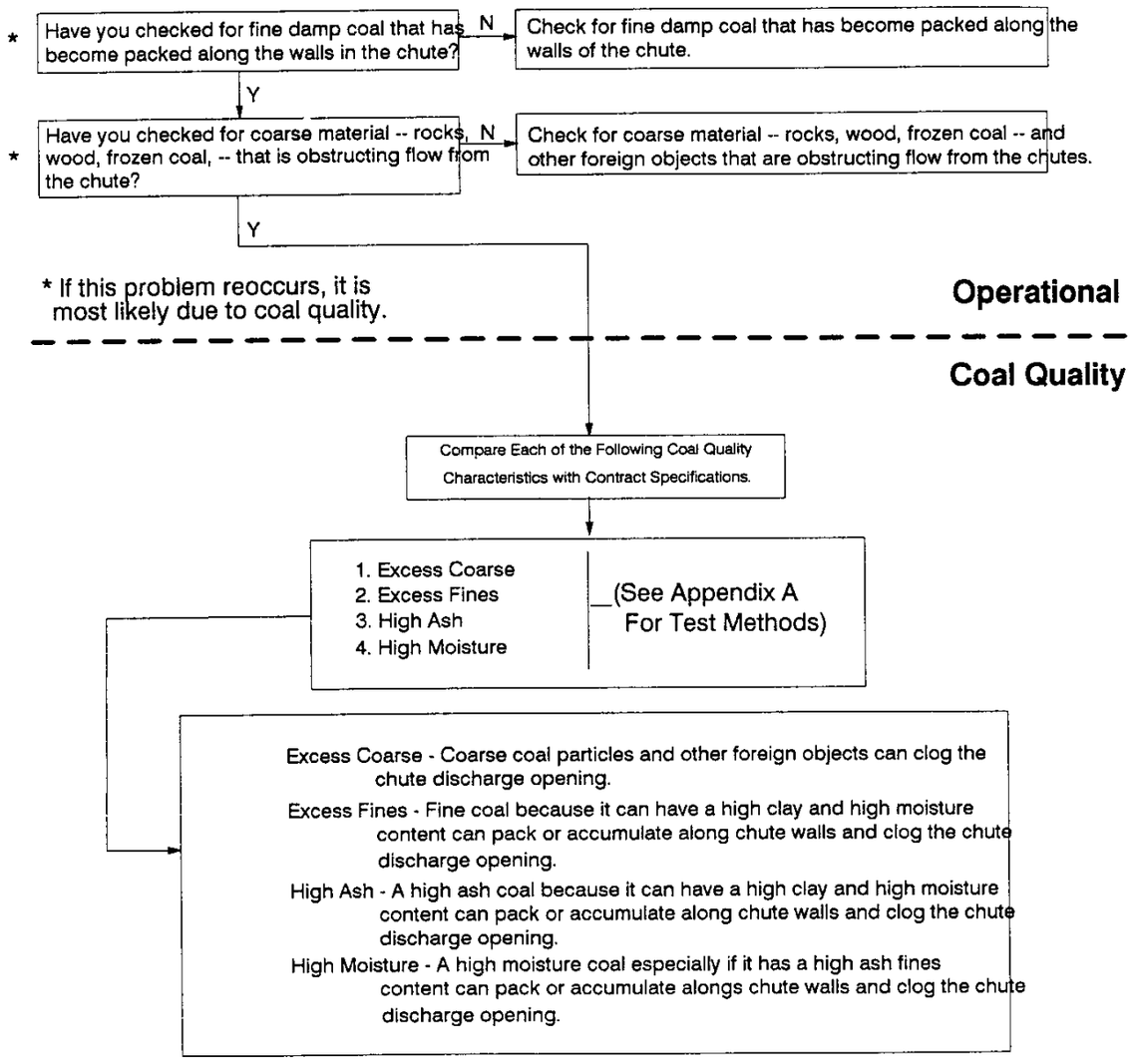


FIG6-42n/2

FIGURE 6-43: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feeder
(Chutes)

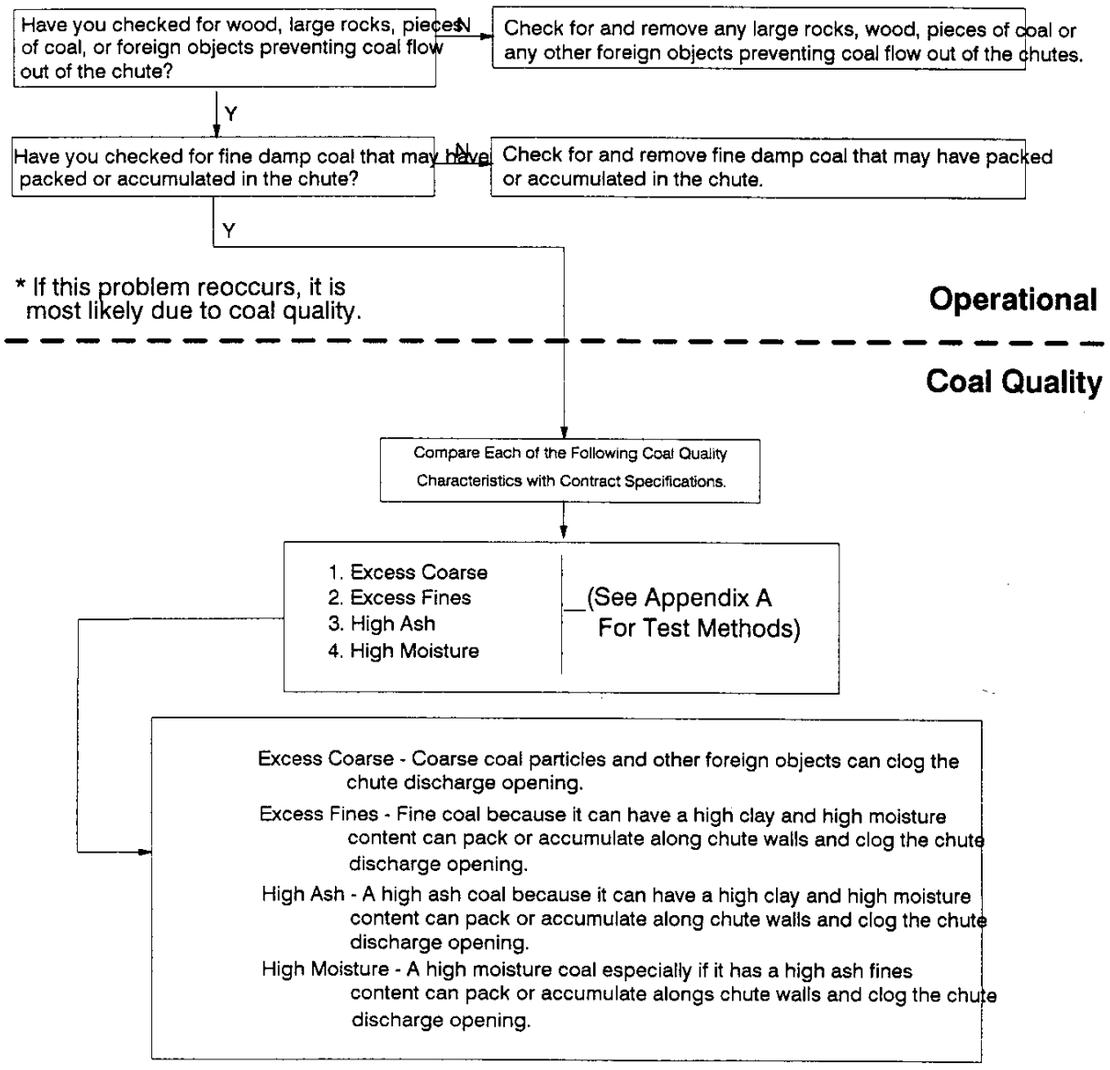


FIG6-43n/2

FIGURE 6-45: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Bunker

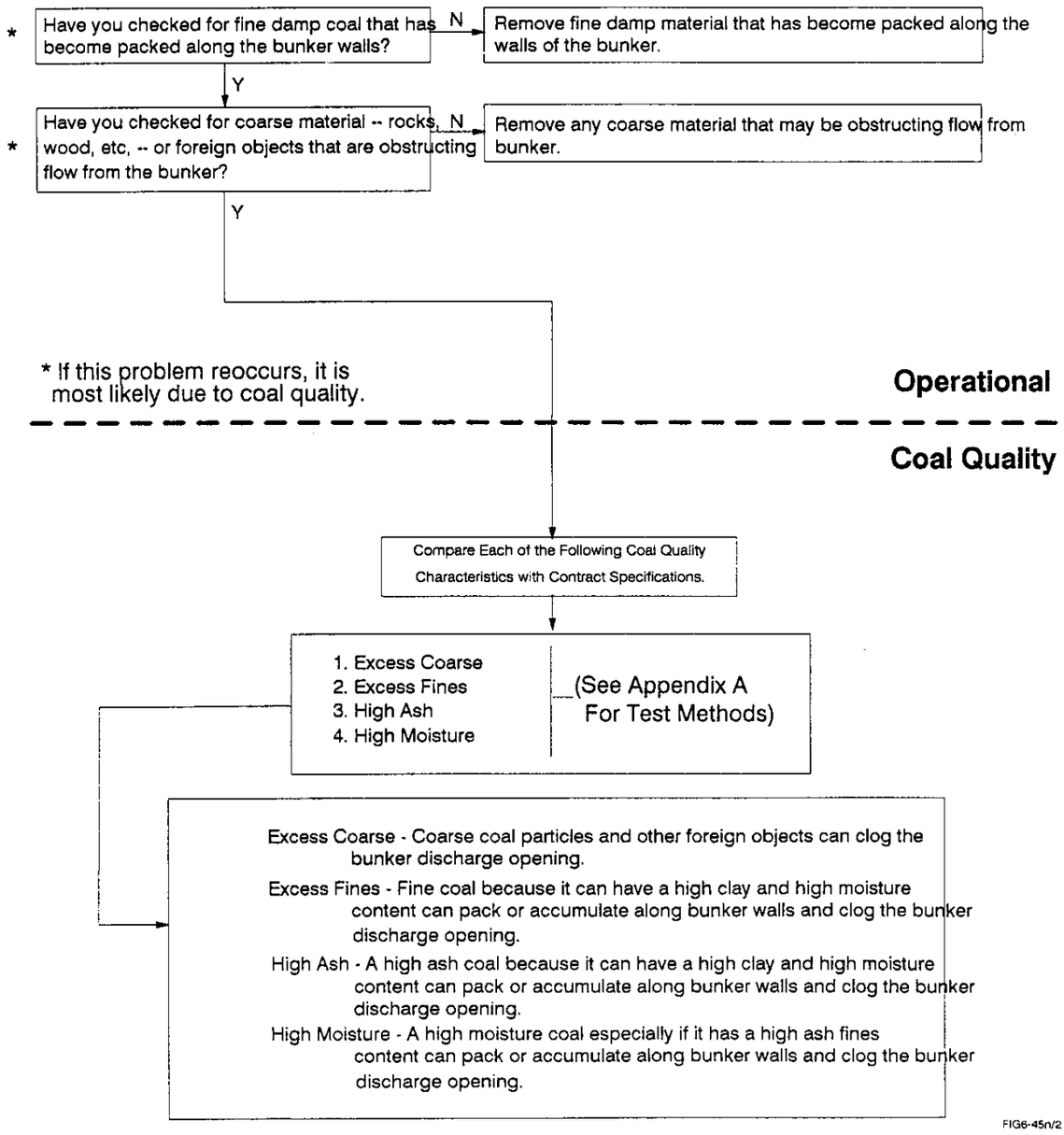


FIGURE 6-46: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Bunker

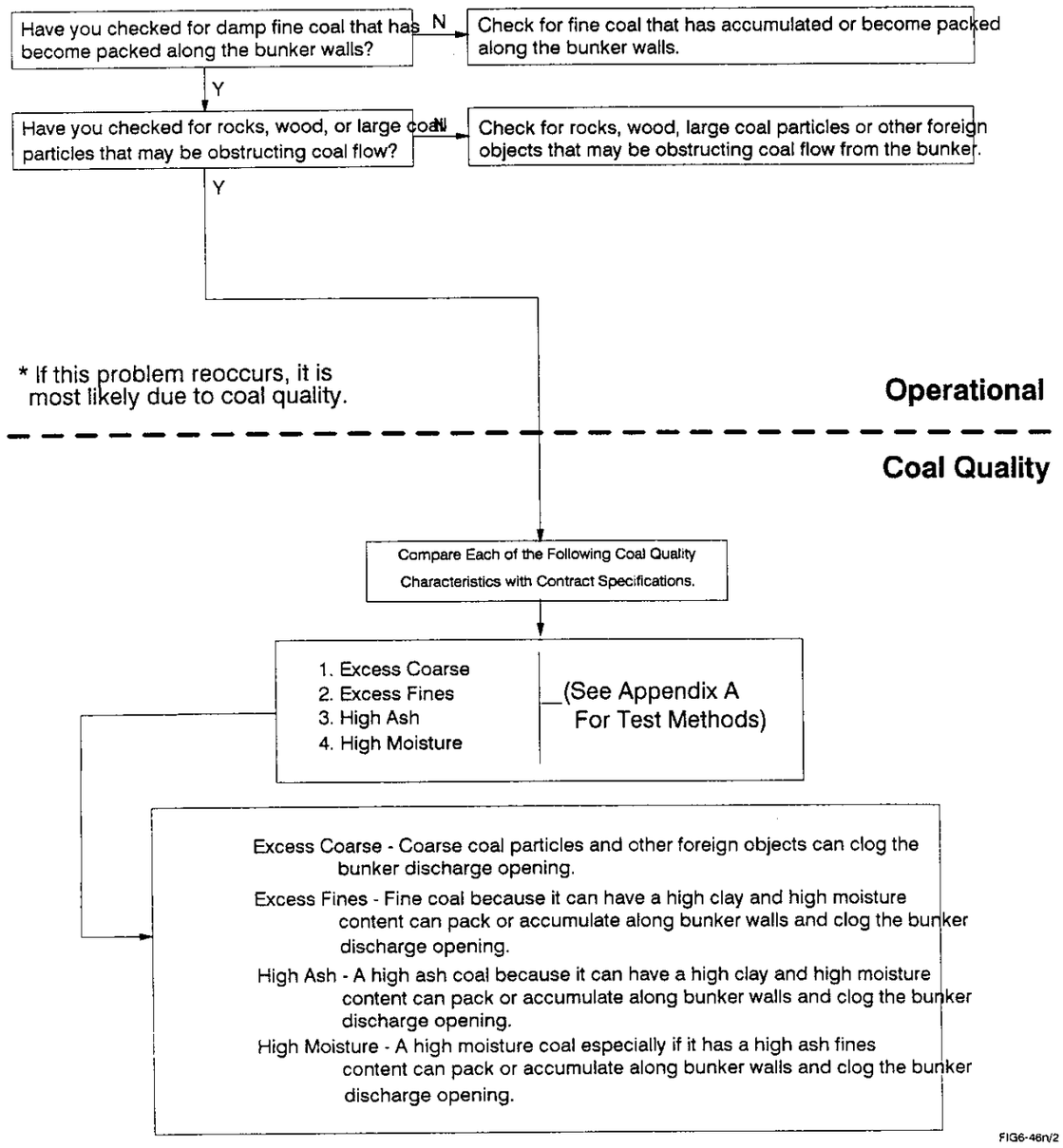


FIGURE 6-47: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Hopper

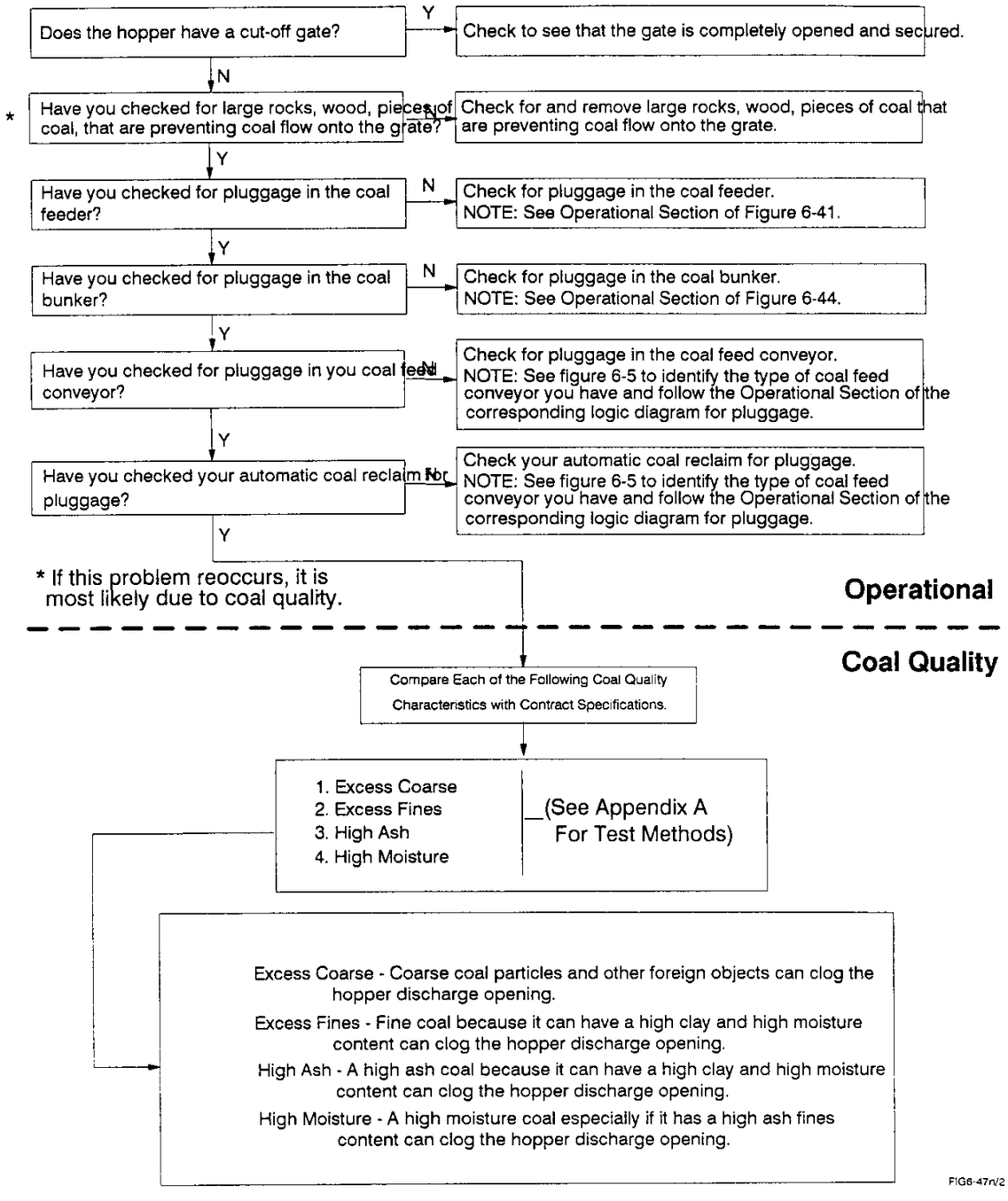


FIGURE 6-48: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM

Insufficient Capacity In The Coal Hopper

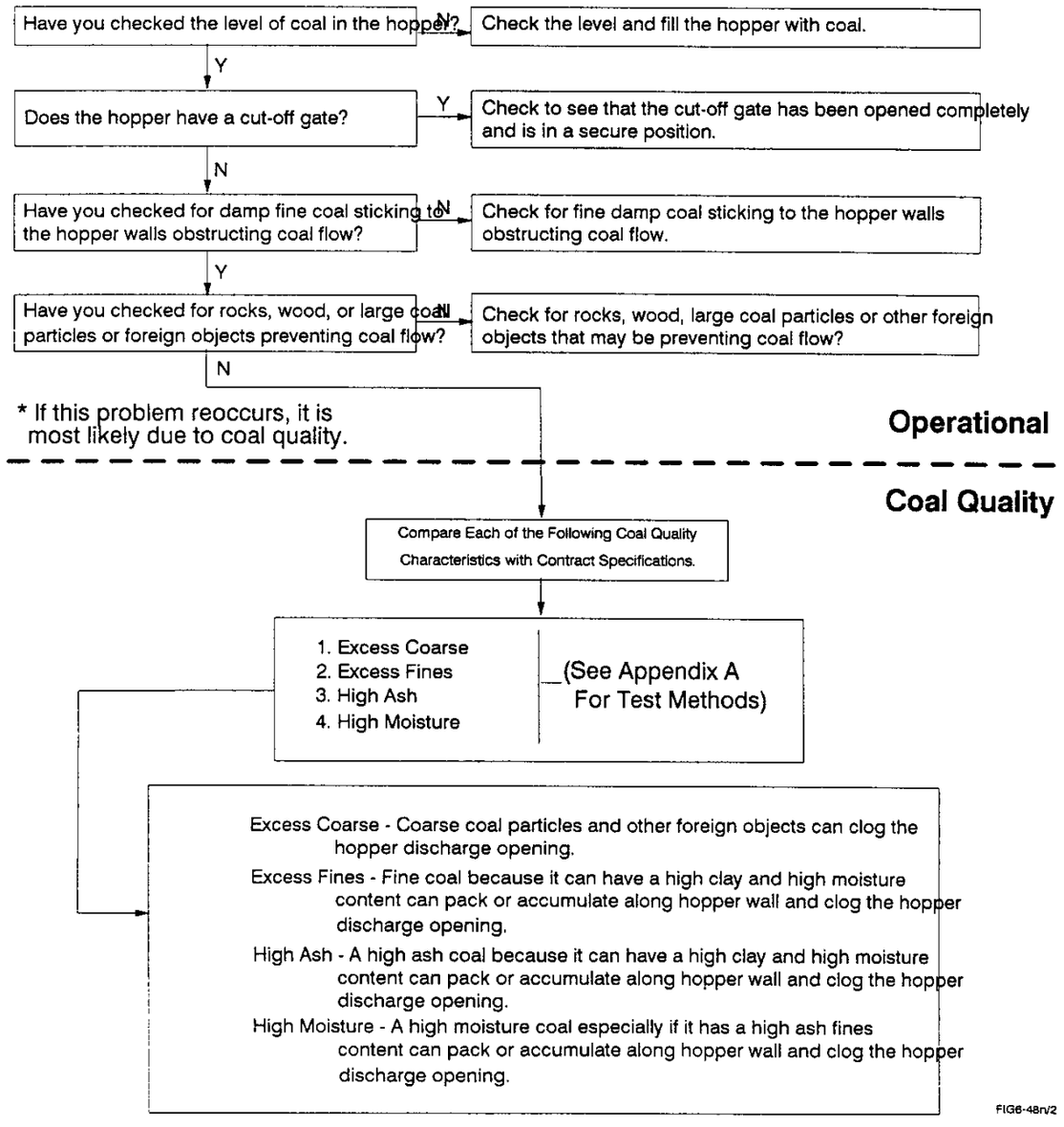


FIGURE 6-49: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Hopper

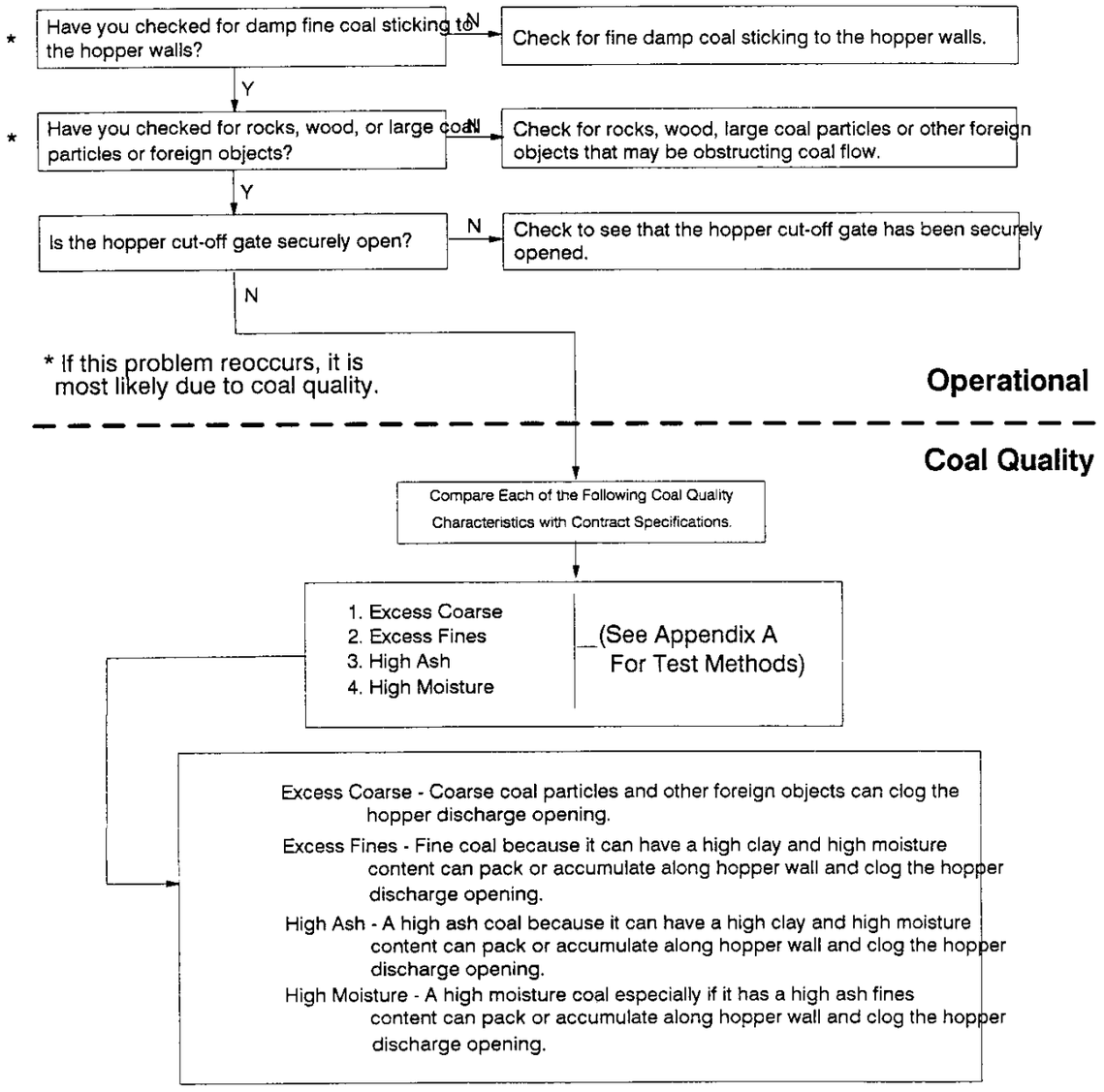


FIG6-49n/2

FIGURE 6-50: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Limestone Bunker/Hopper

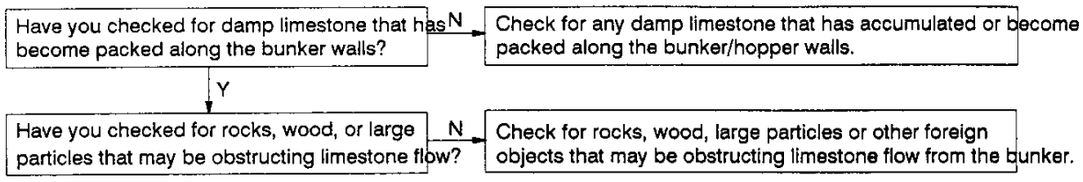


FIG6-50n/2

FIGURE 6-51: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity From The Limestone Bunker/Hopper

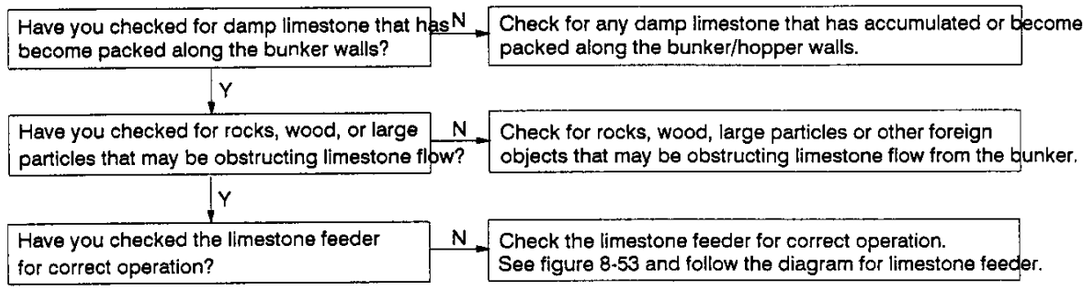


FIG6-50n/2

FIGURE 6-52: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Erratic Feeding From The Limestone Bunker/Hopper

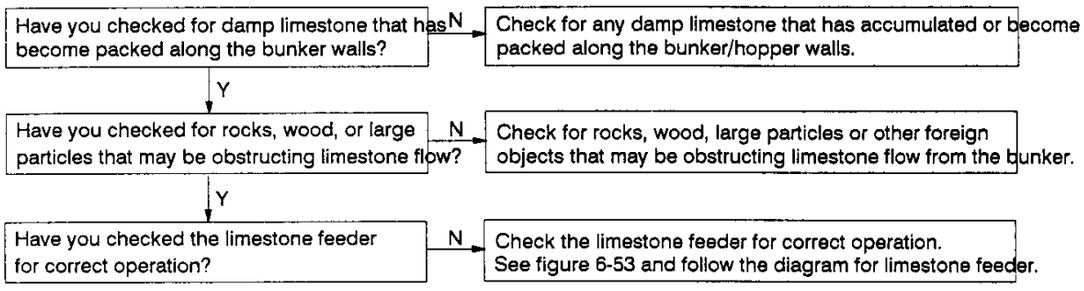


FIG6-52n/2

FIGURE 6-53: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Pluggage Of The Limestone Feeder

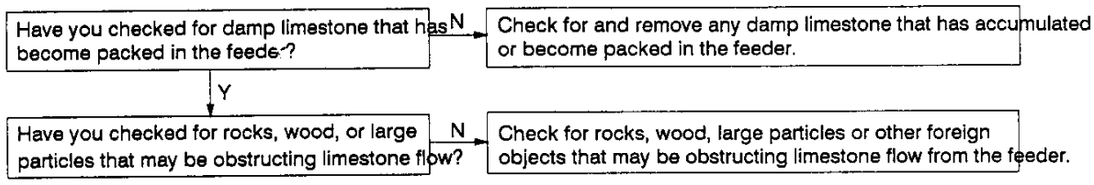
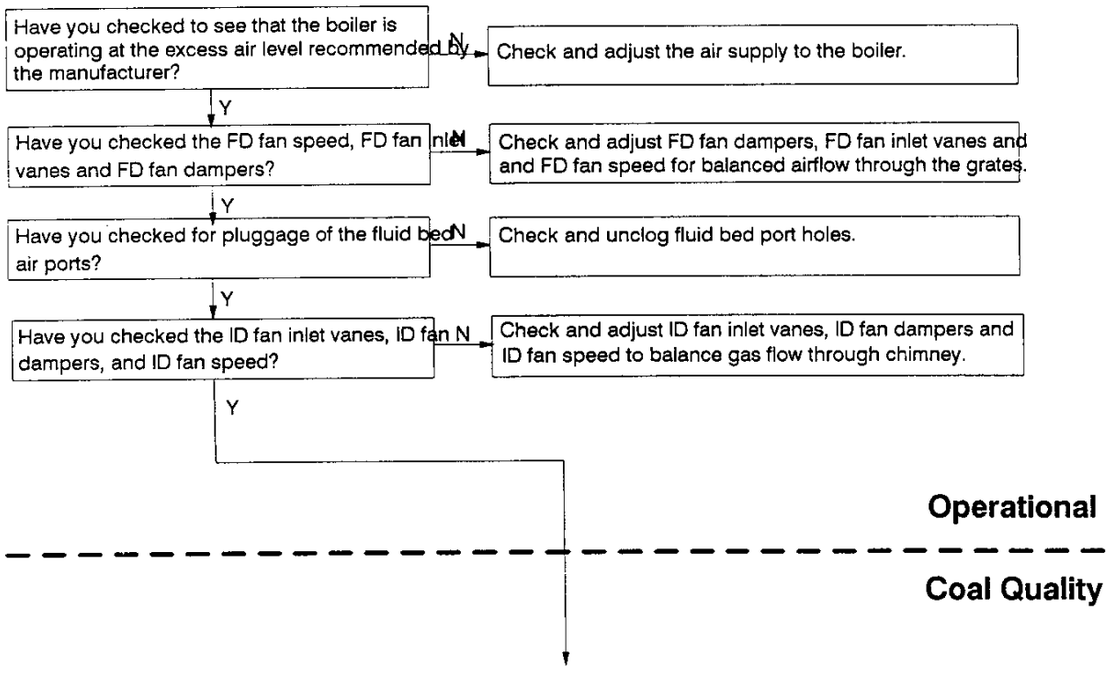


FIG6-53n/2

FIGURE 6-54: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Boiler)



See next page for Coal Quality Section.

FIG6-54n/2

RE 6-54 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG
For Insufficient Capacity And Inability To Meet Load

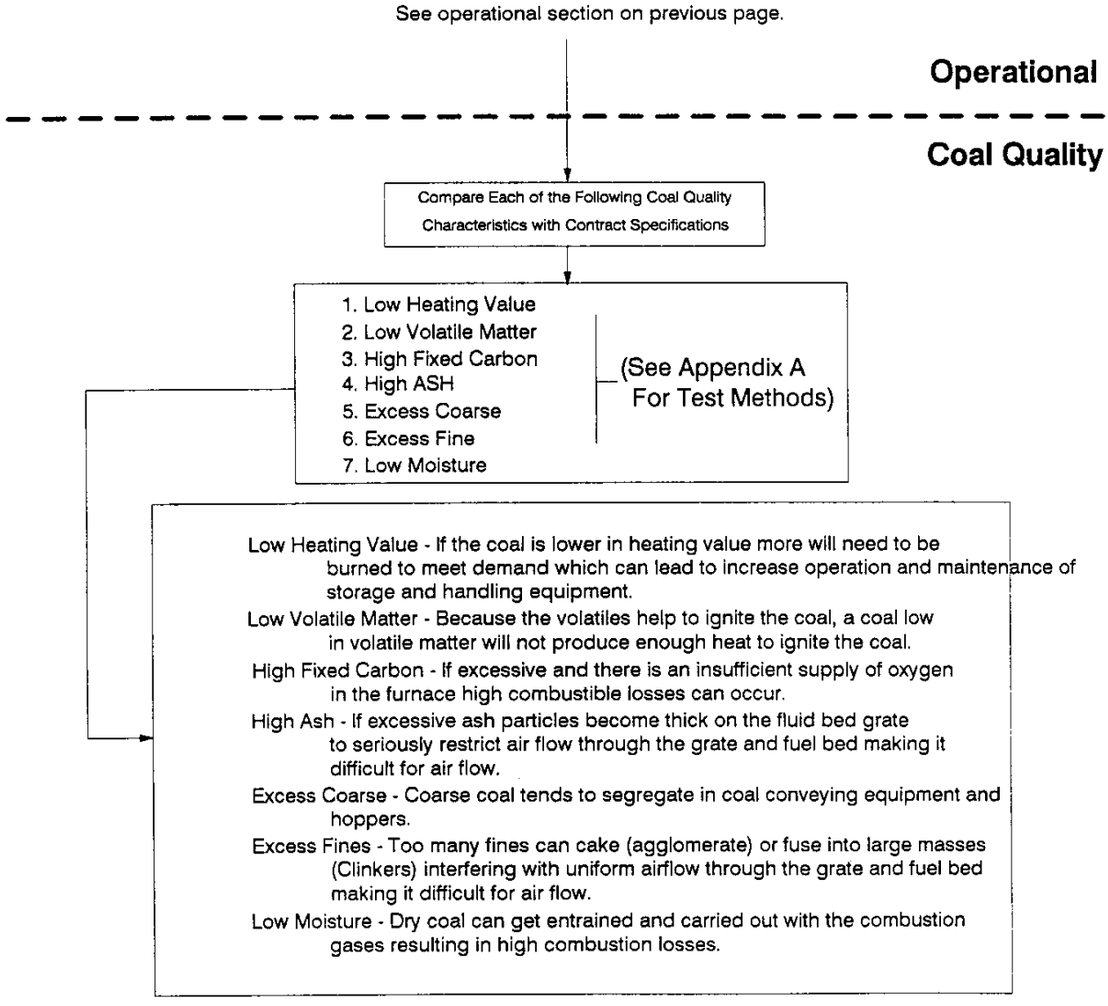


FIG6-54nb/2

FIGURE 6-55: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Reduced Boiler Efficiency

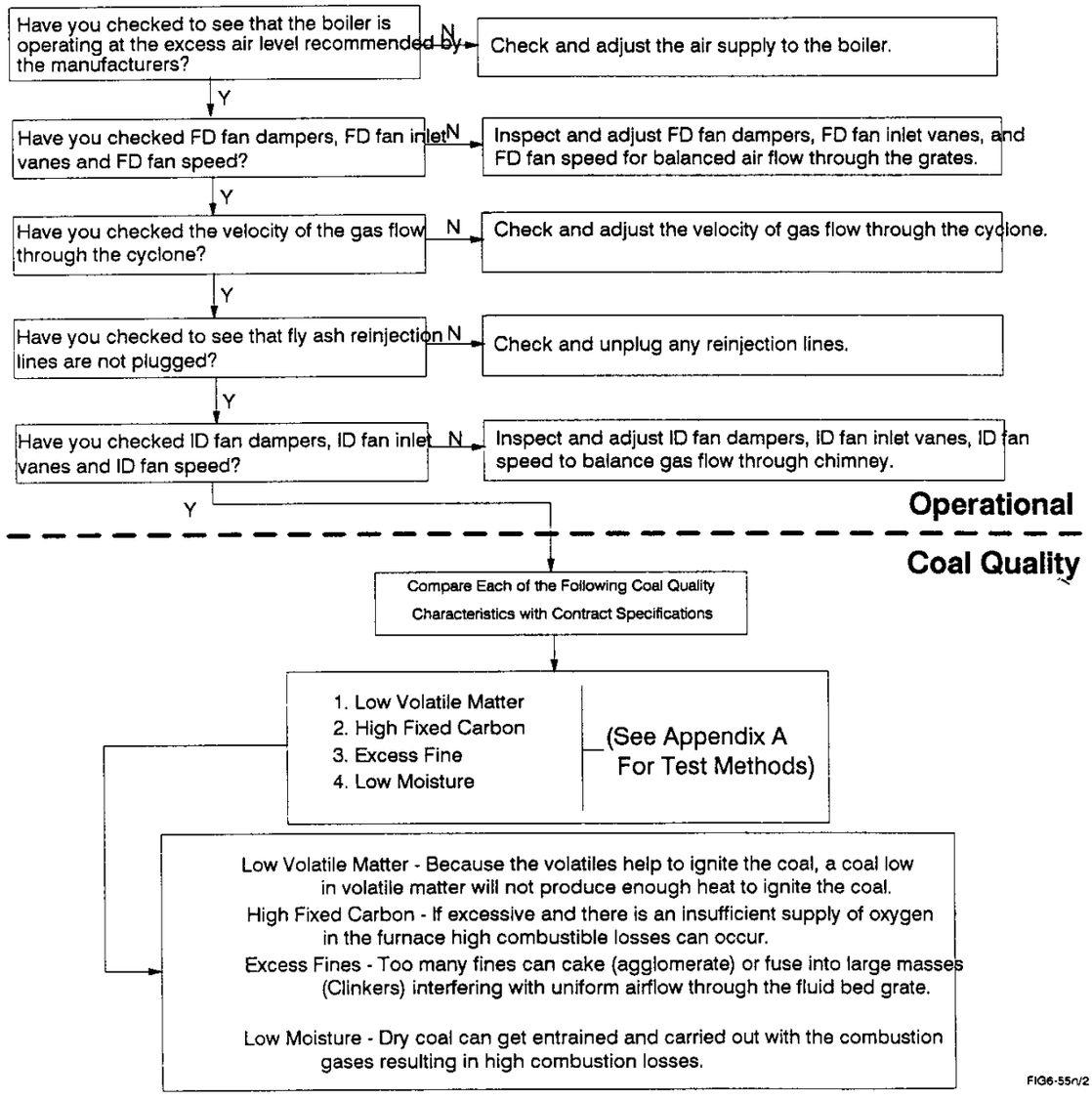


FIGURE 6-56: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Boiler Components

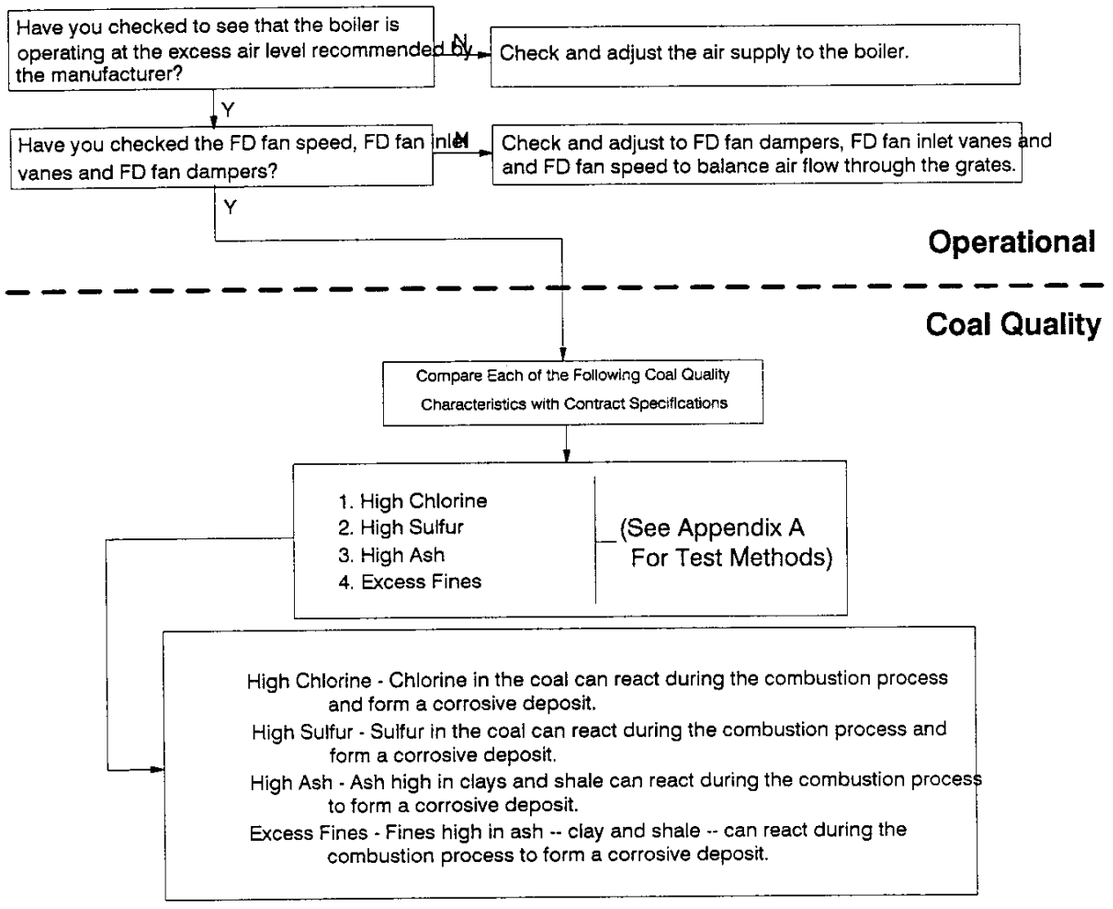


FIG6-56n/2

FIGURE 6-57: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Refractory Surfaces

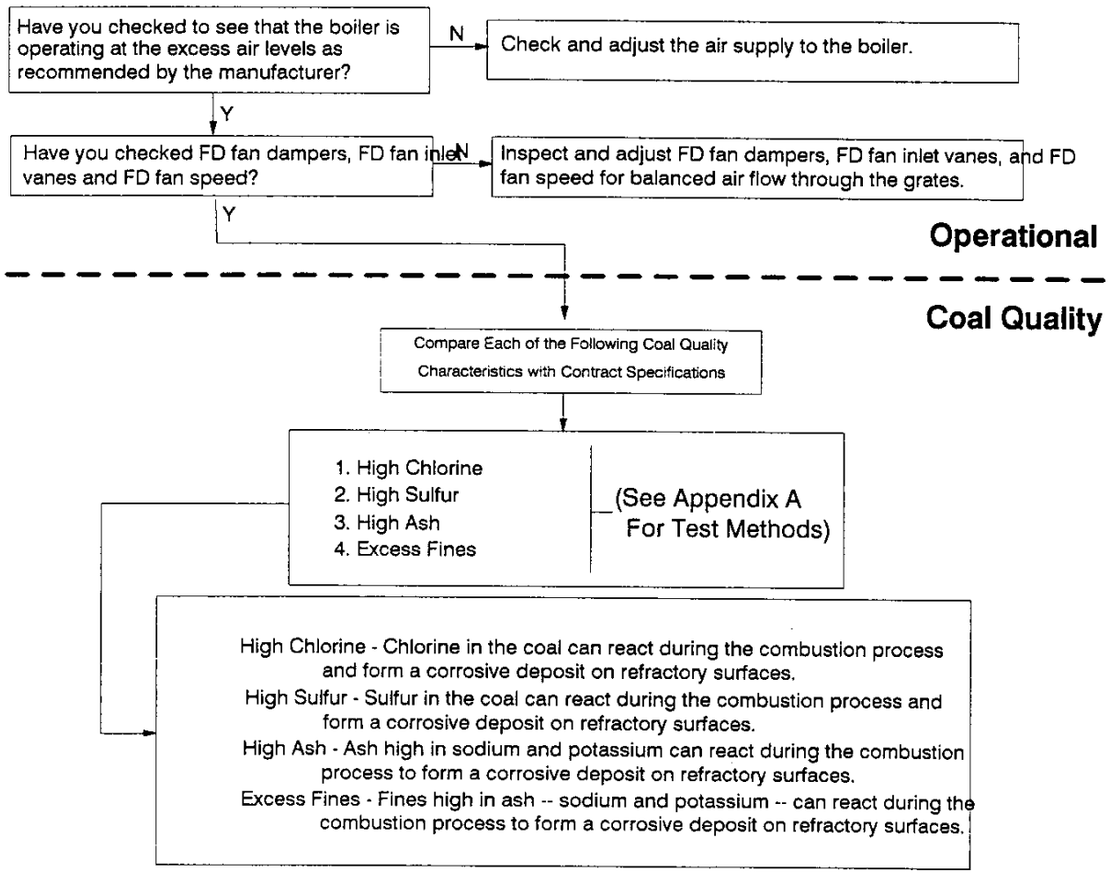


FIG6-57n/2

FIGURE 6-58: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Erosion Of The Refractory Surfaces

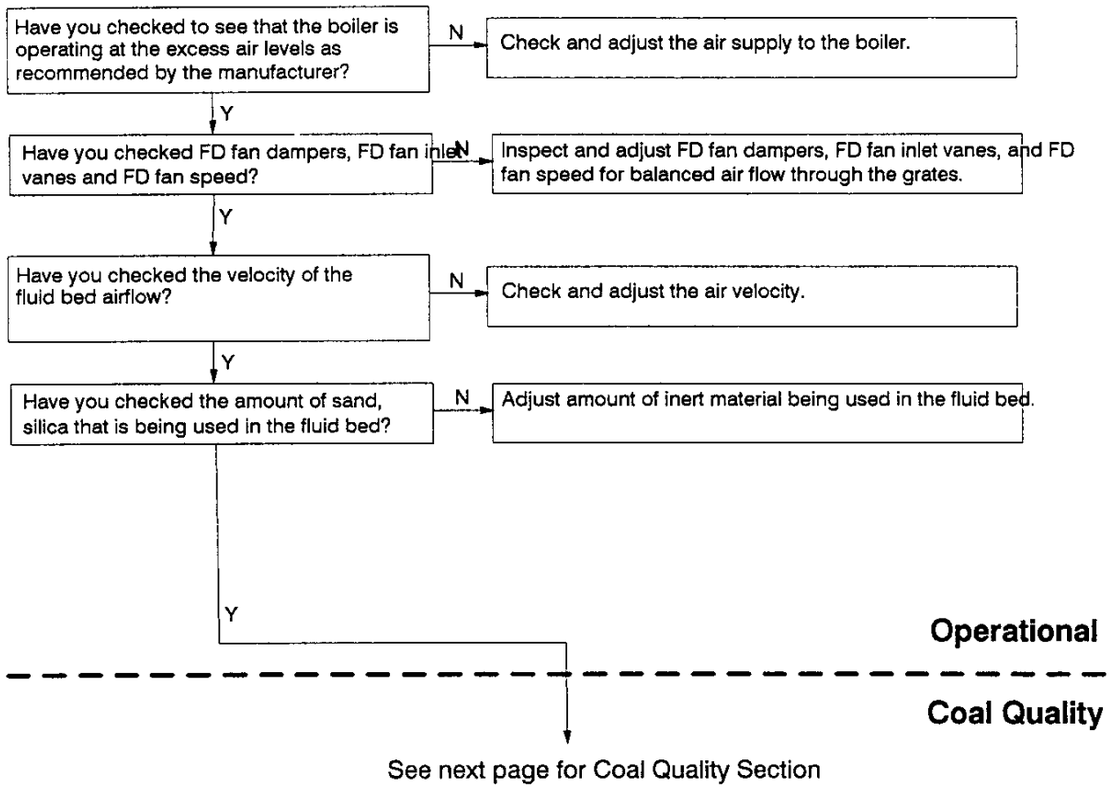


FIG6-58rv2

RE 6-58 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG

For Erosion Of Refractory Surfaces

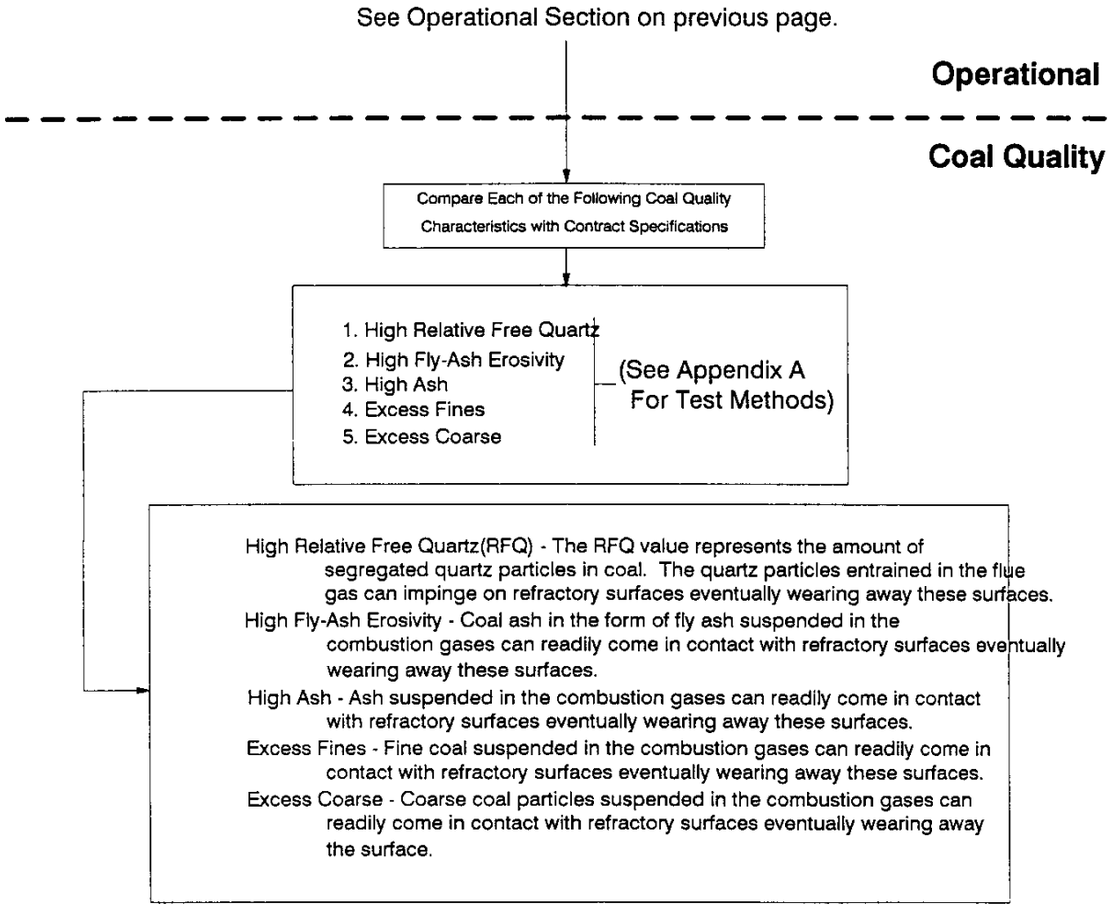


FIG6-58nb/2

FIGURE 6-59: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Slagging/Spalling Of Refractory Surfaces

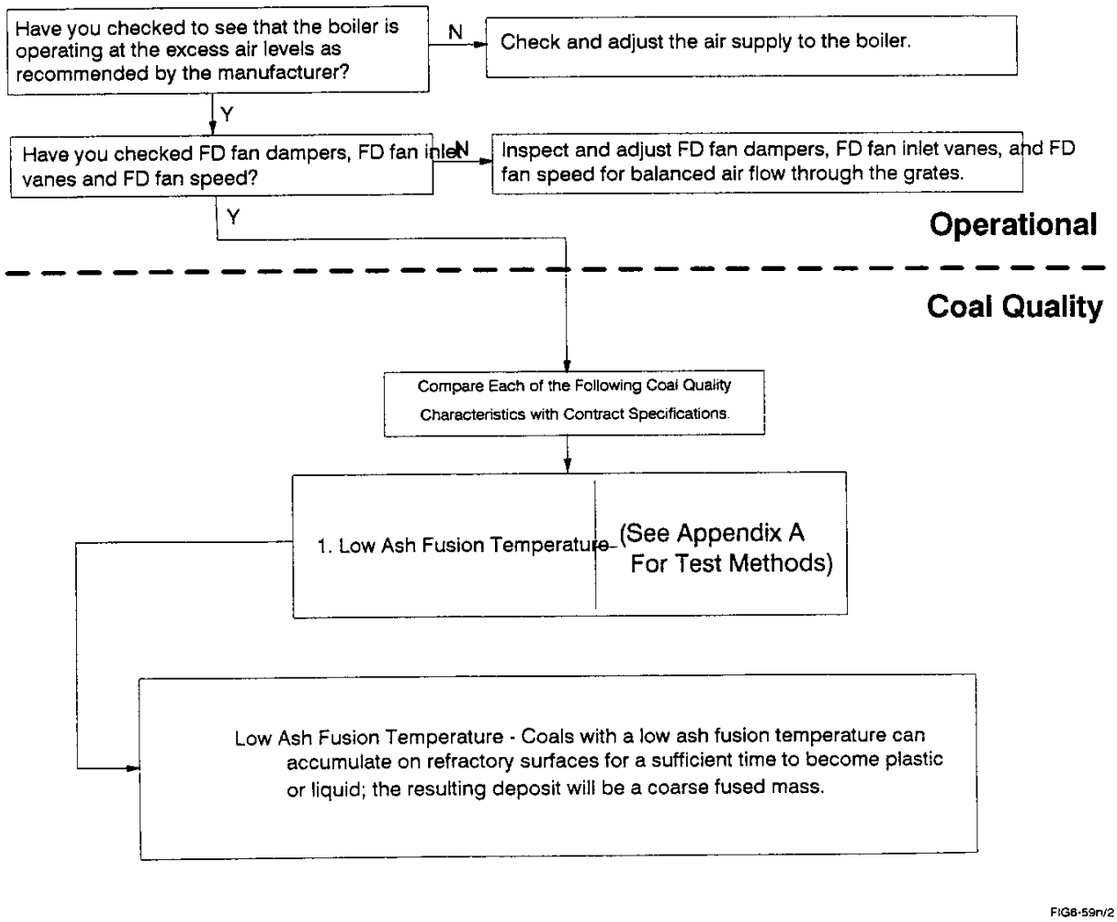


FIG8-59rv2

FIGURE 6-60: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Corrosion Of The Heat Transfer Surfaces (Boiler Tubes and Water Walls)

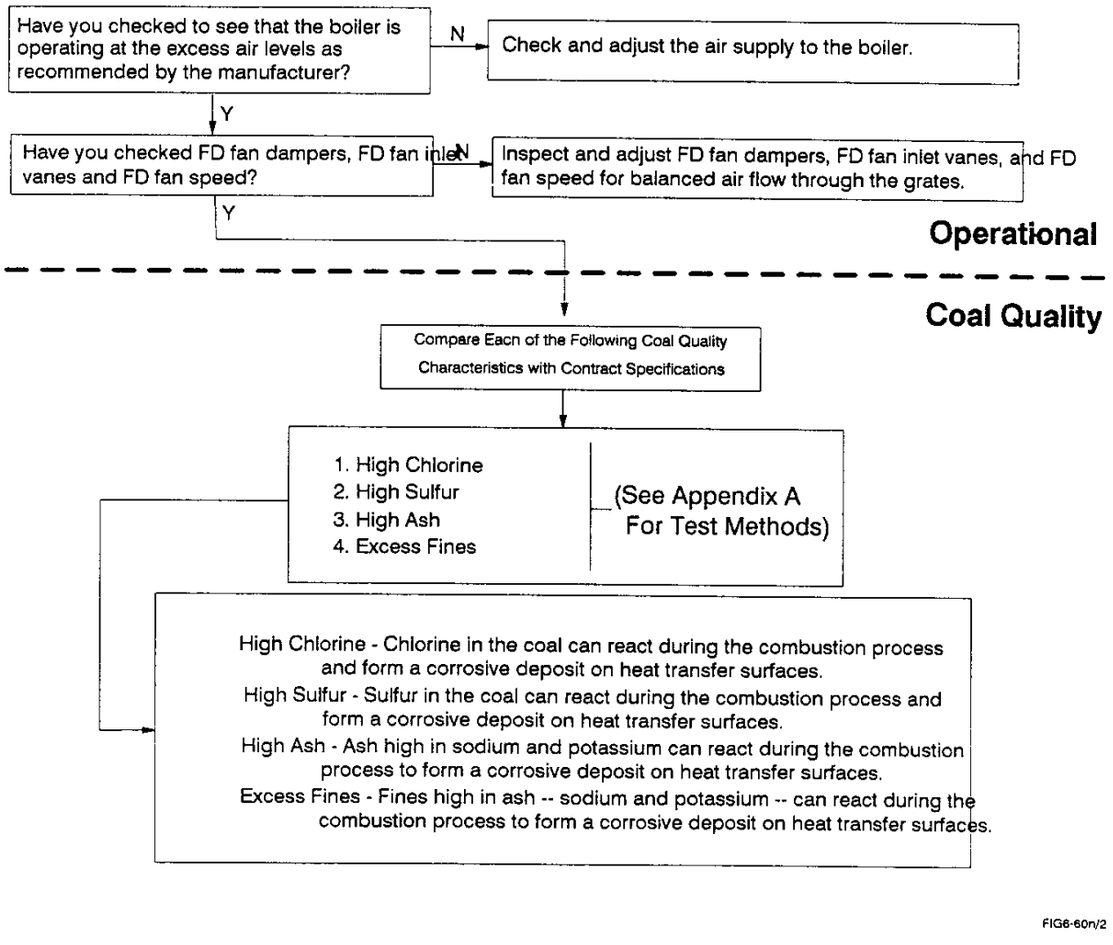
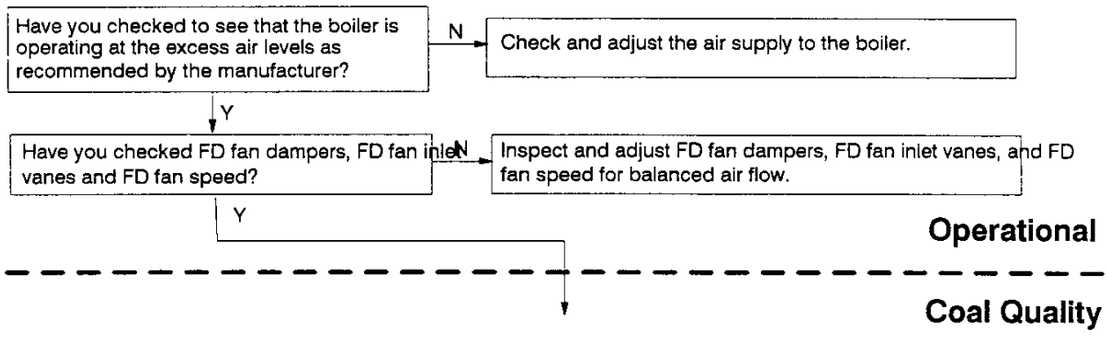


FIG6-60n/2

FIGURE 6-61: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Heat Transfer Surfaces
(Boiler Tubes and Water Walls)



See next page for Coal Quality Section

FIG6-61n/2

FIGURE 6-61: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

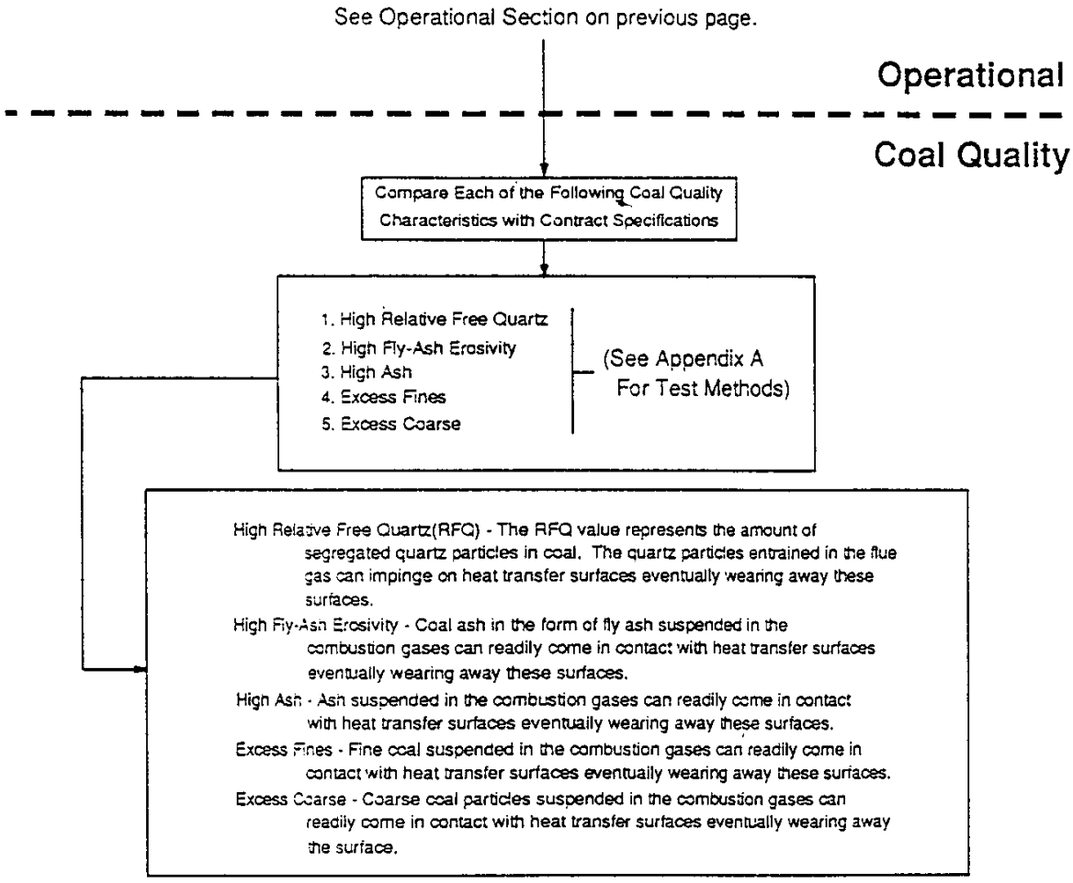


FIG5-69no/2

FIGURE 6-62: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Slagging Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

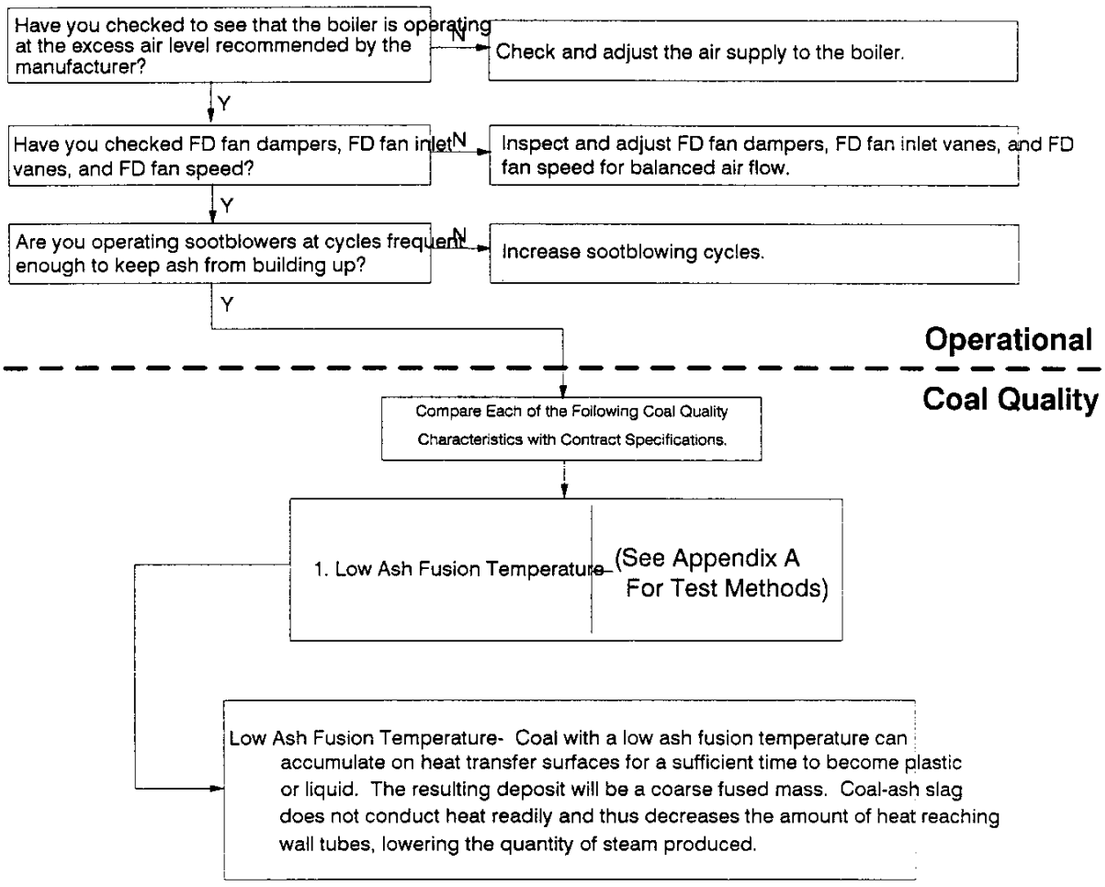


FIG6-62N/2

FIGURE 6-63: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Fouling Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

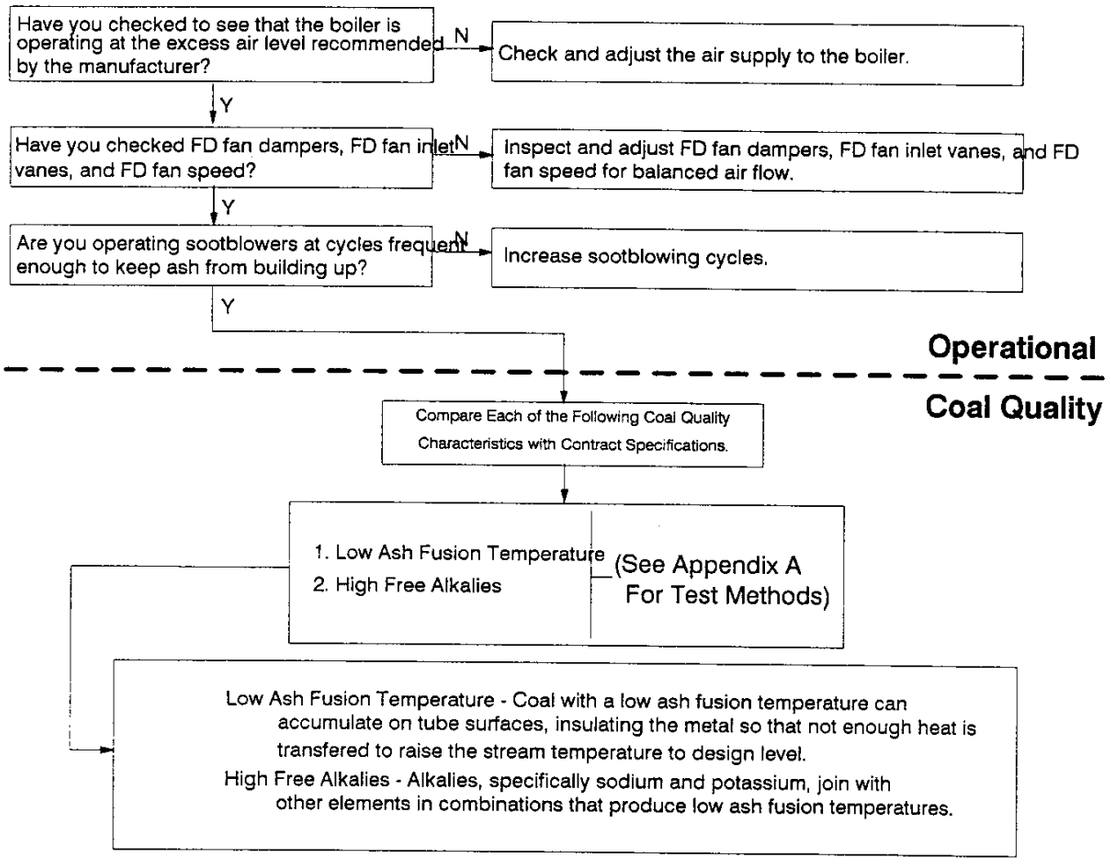


FIG6-63N/2

FIGURE 6-64: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Baffles

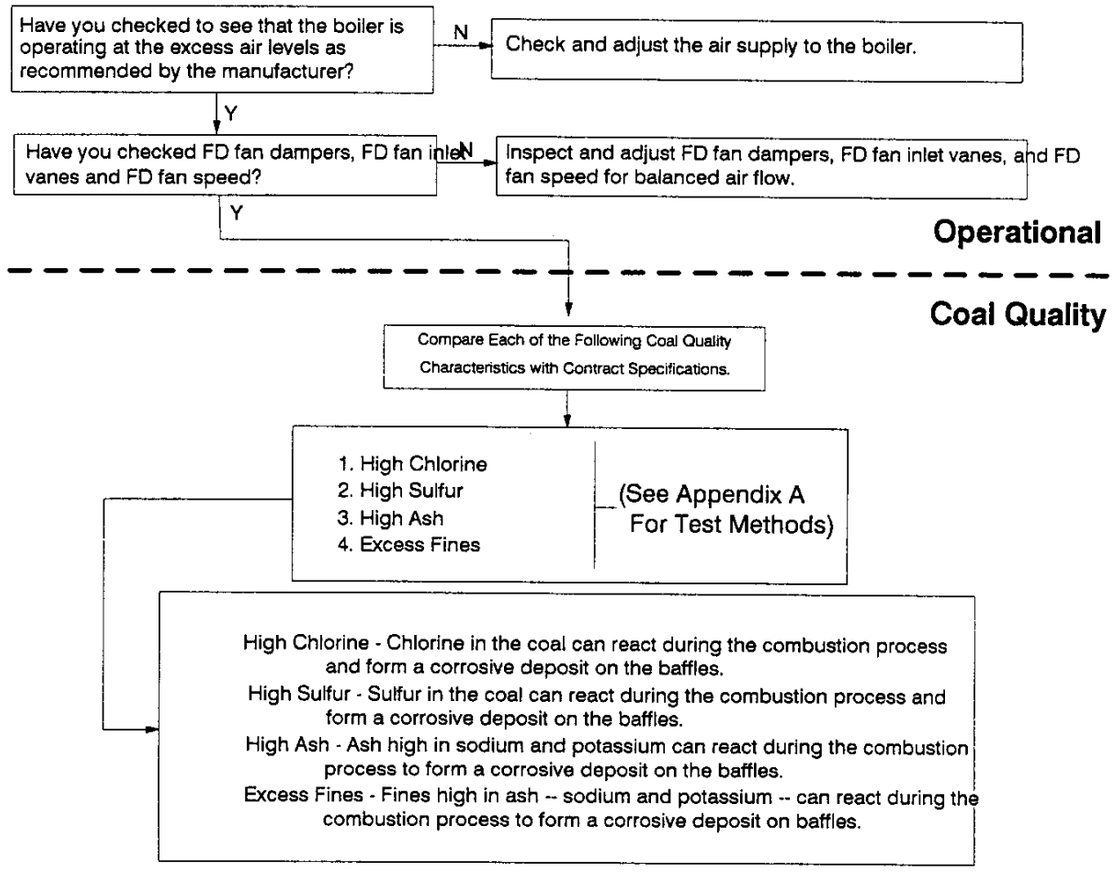
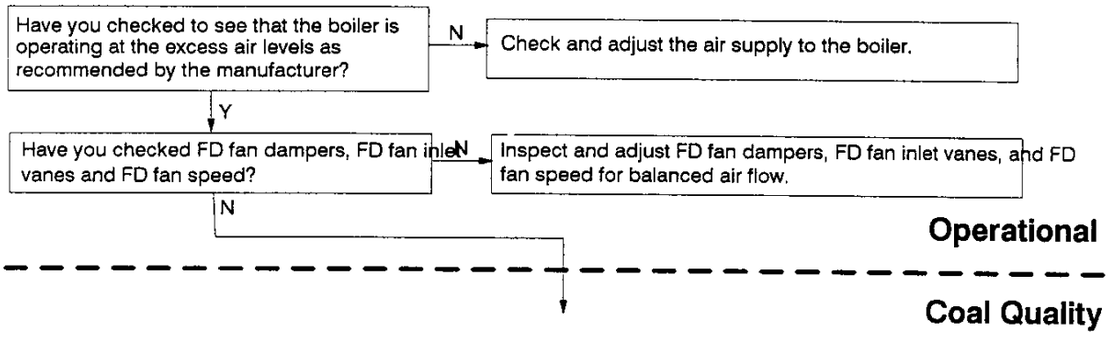


FIG6-64rV3

FIGURE 6-65: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Heat Transfer Surfaces
(Baffles)



See next page for Coal Quality Section

FIG6-65n/2

RE 6-65 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG

For Erosion Of Heat Transfer Surfaces

(Baffles)

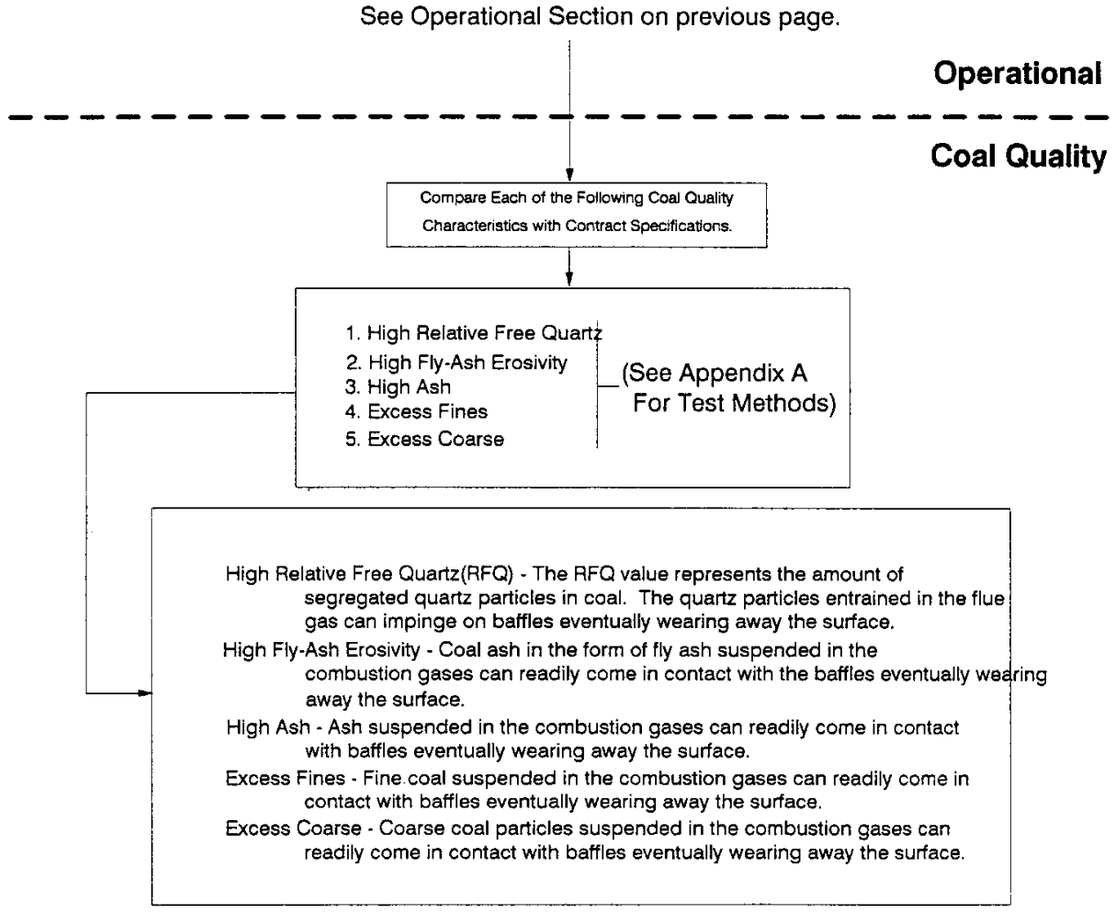


FIG8-65nb/2

FIGURE 6-66: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Slagging Of Heat Transfer Surfaces
(Baffles)

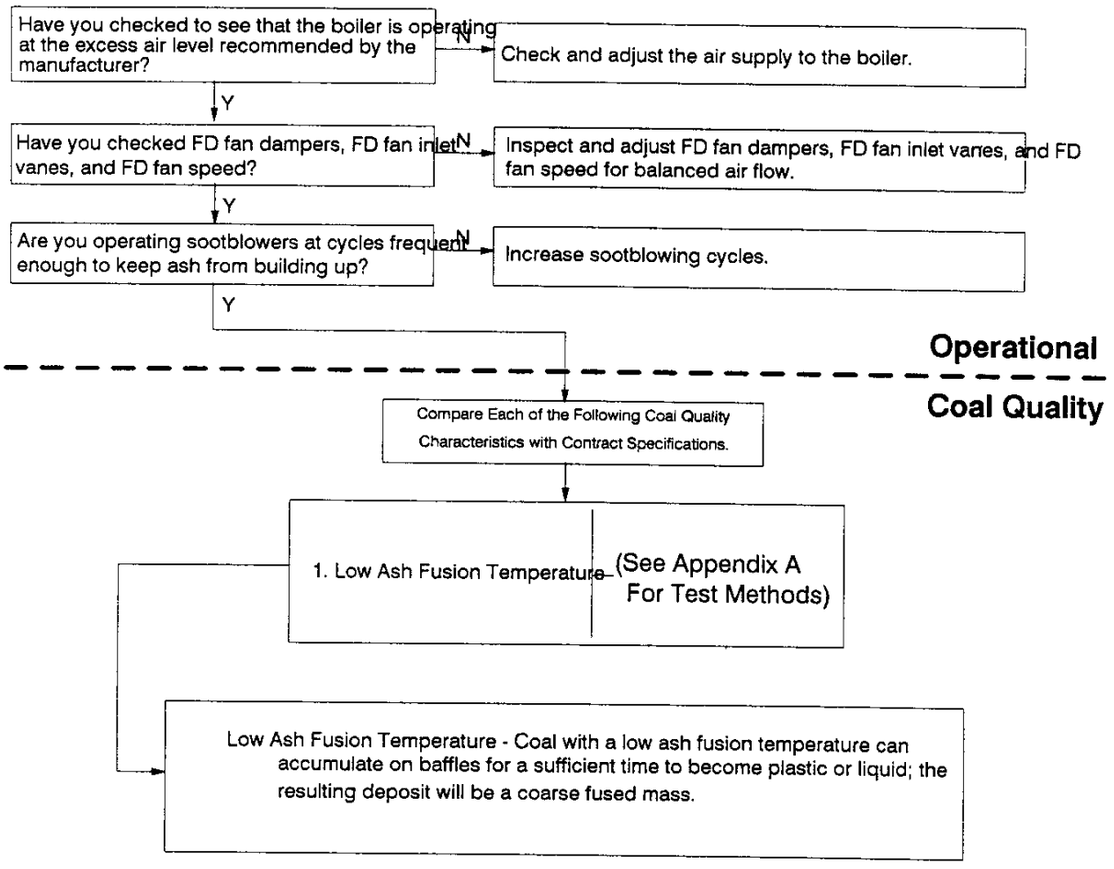


FIG8-66N/2

FIGURE 6-67: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Fouling Of Heat Transfer Surfaces (Baffles)

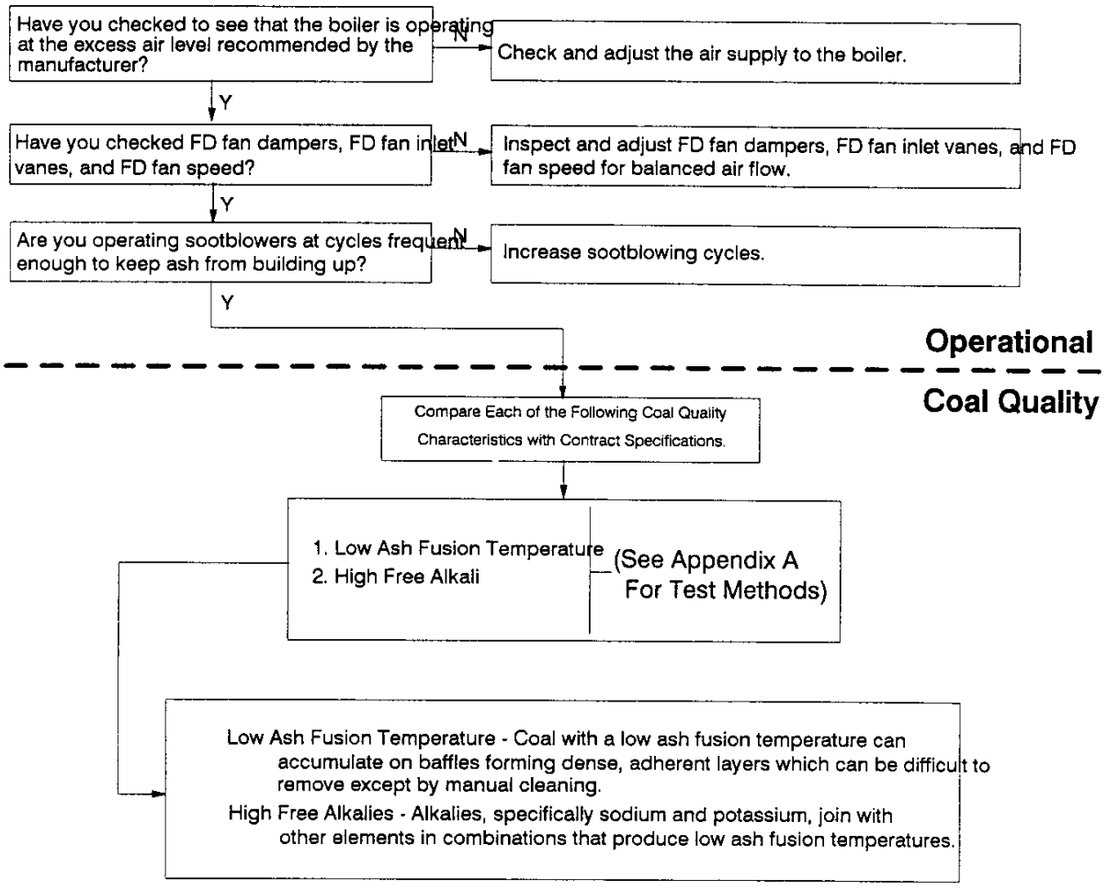


FIG6-67N/2

FIGURE 6-68: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Forced Draft Fan)

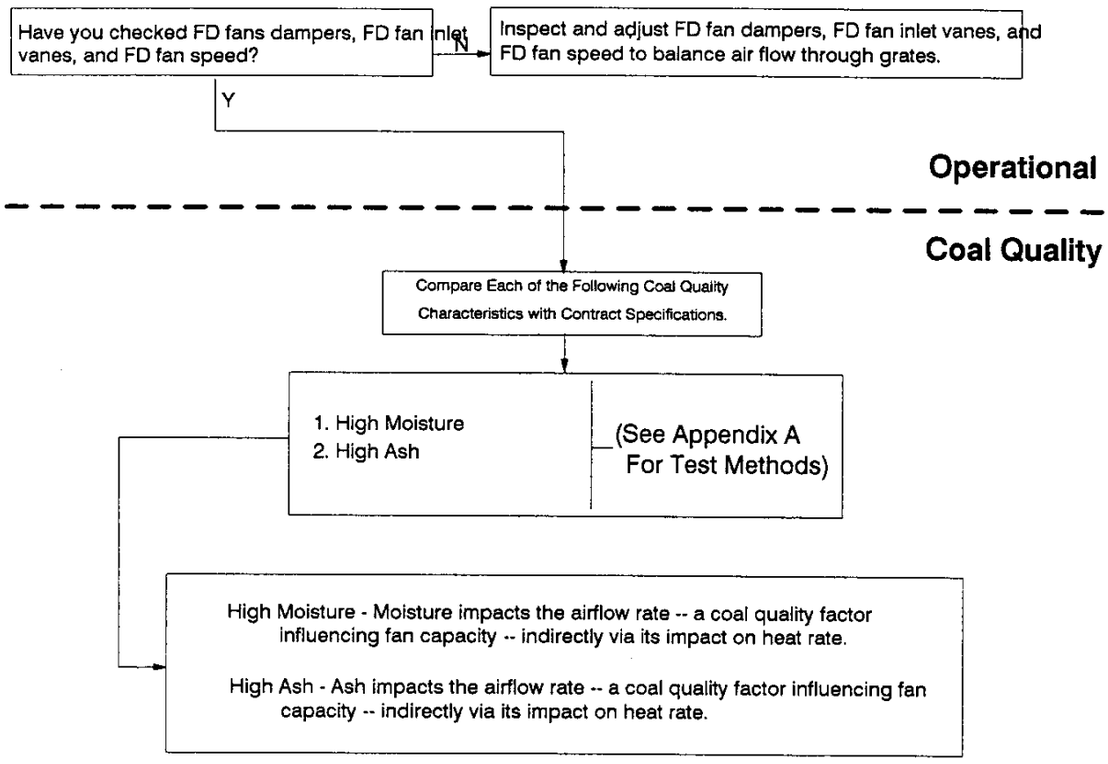


FIG6-68n/3

FIGURE 6-69: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Smoking Around The Forced Draft Fan

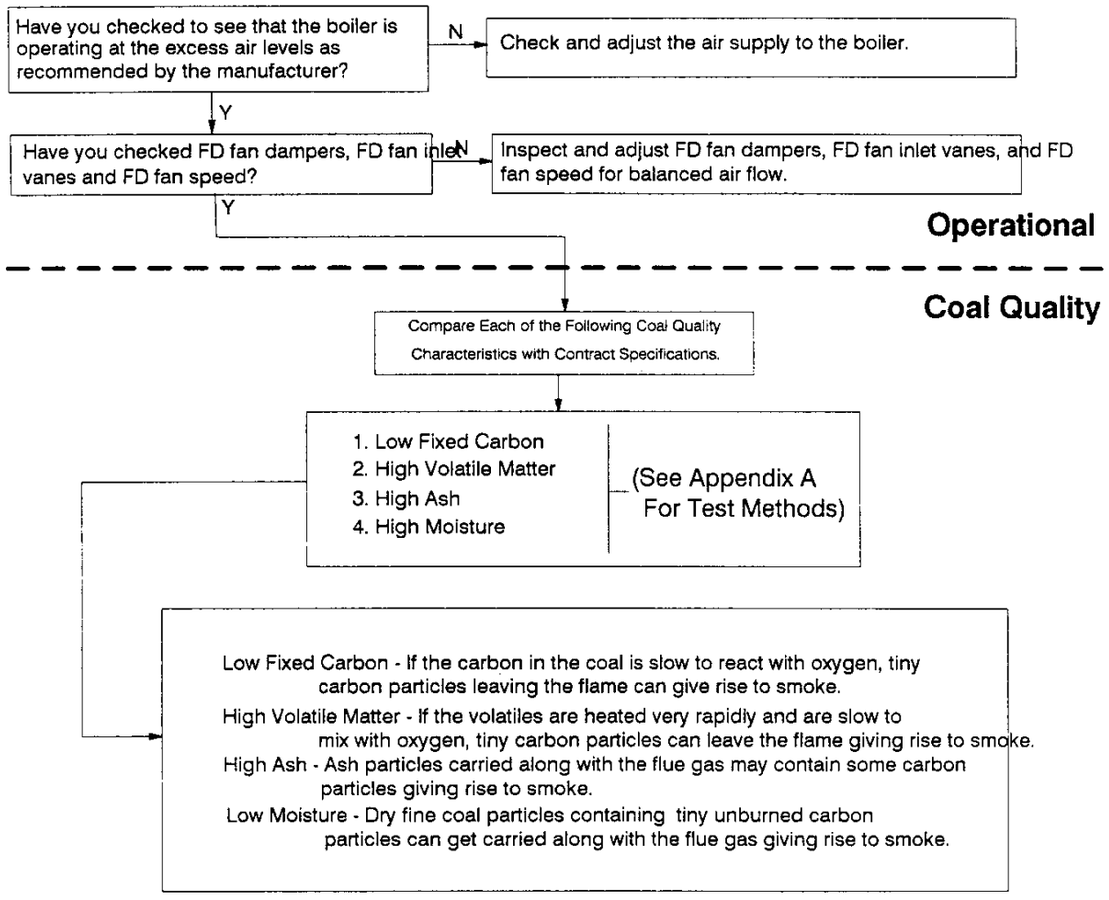


FIG6-69n/3

FIGURE 6-70: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Induced Draft Fan)

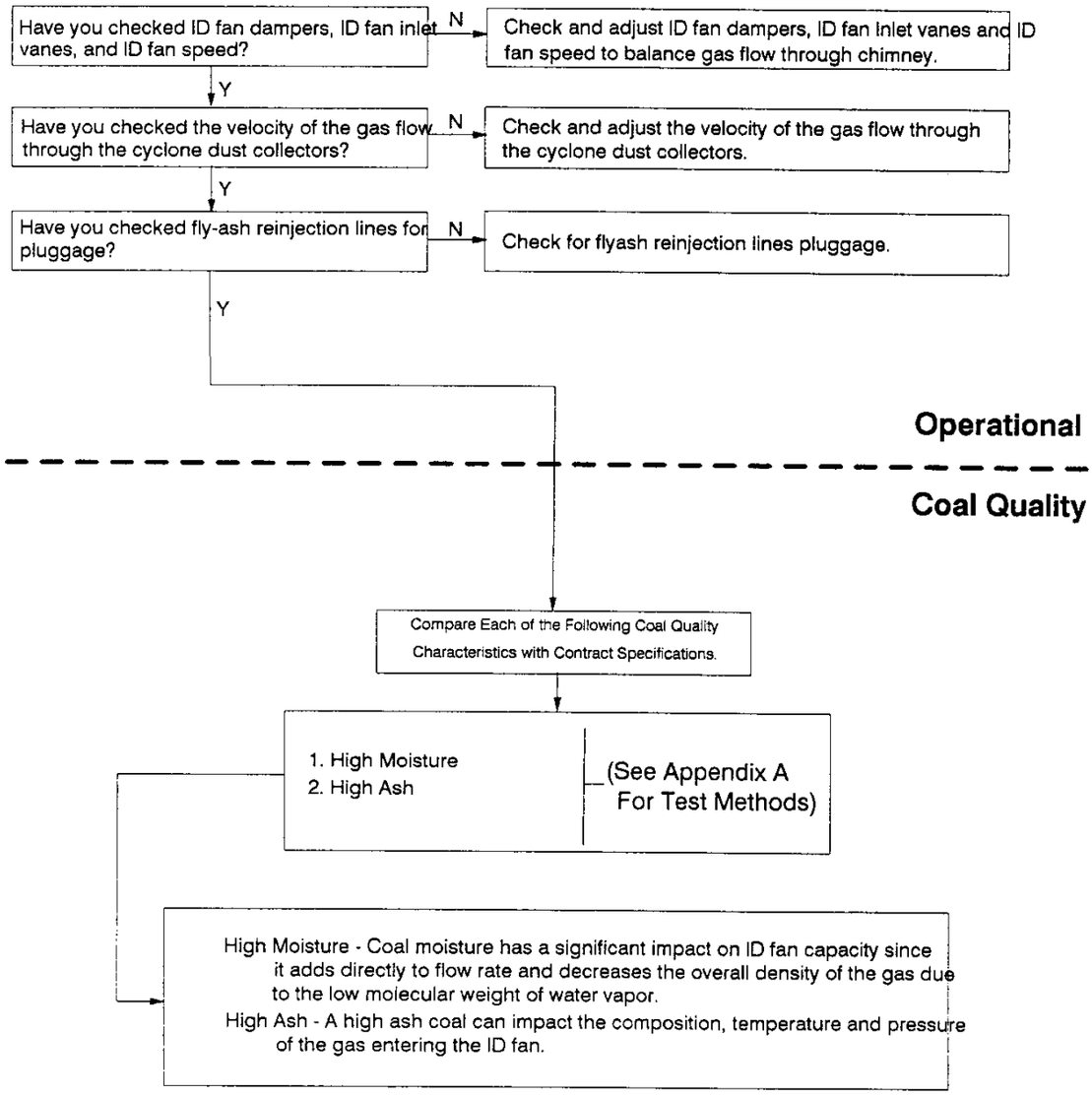


FIG6-70n/3

FIGURE 6-71: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Induced Draft Fan

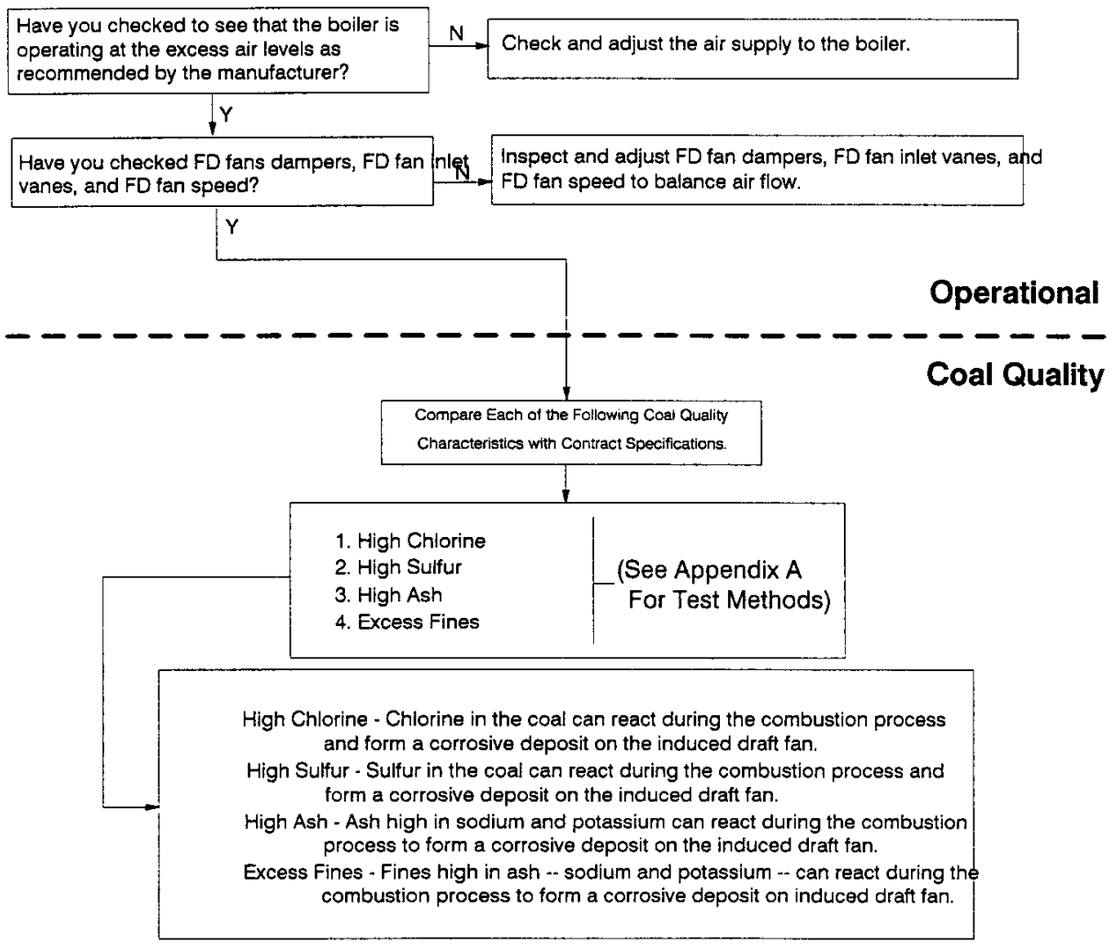
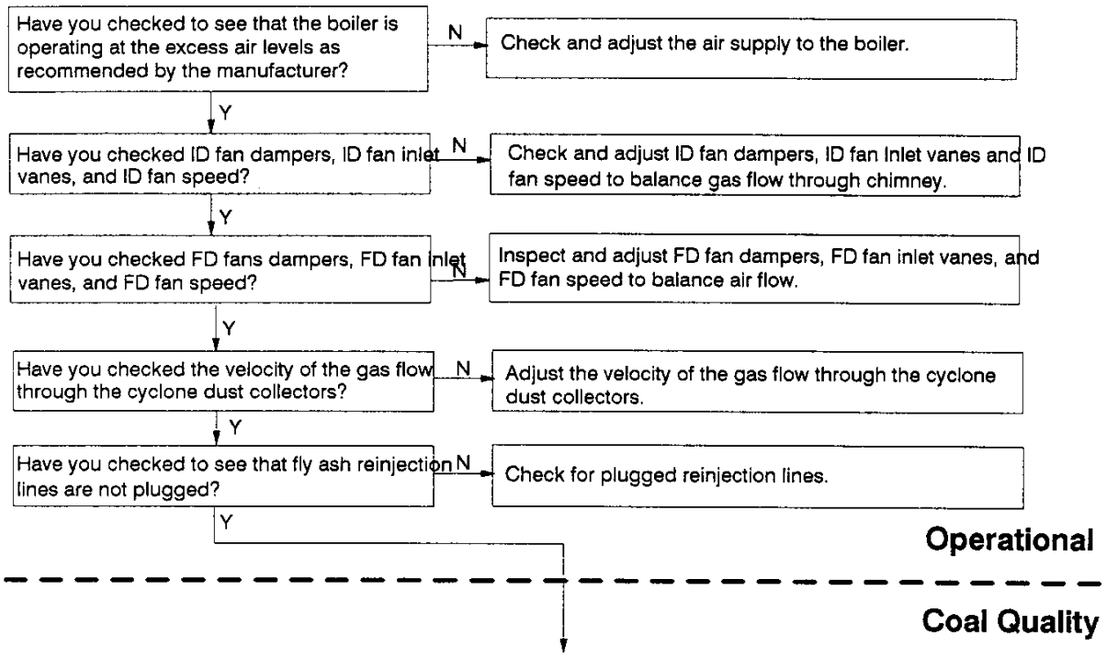


FIG6-71n/3

FIGURE 6-72: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM

For Smoking From The Induced Draft Fan



See next page for the Coal Quality Section.

FIG6-72n/3

RE 6-72 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG

For Smoking From The Induced Draft Fan

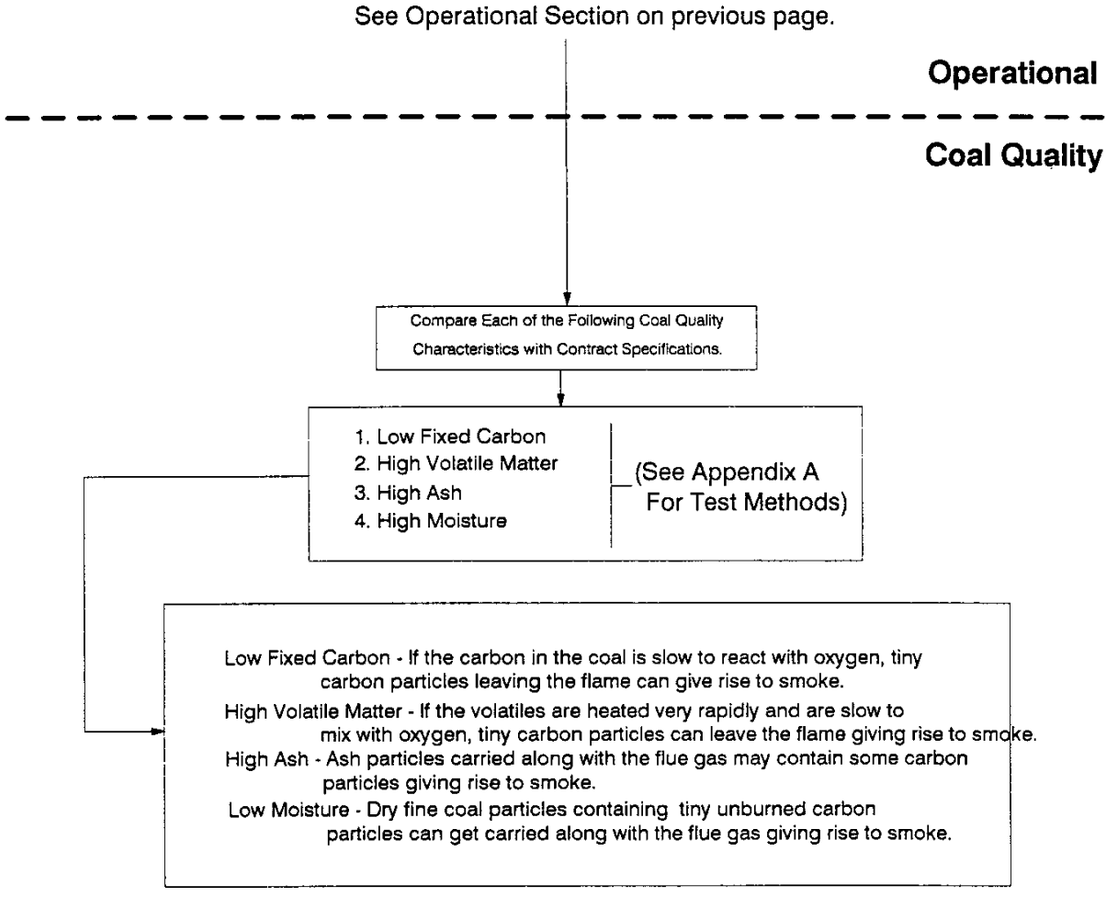
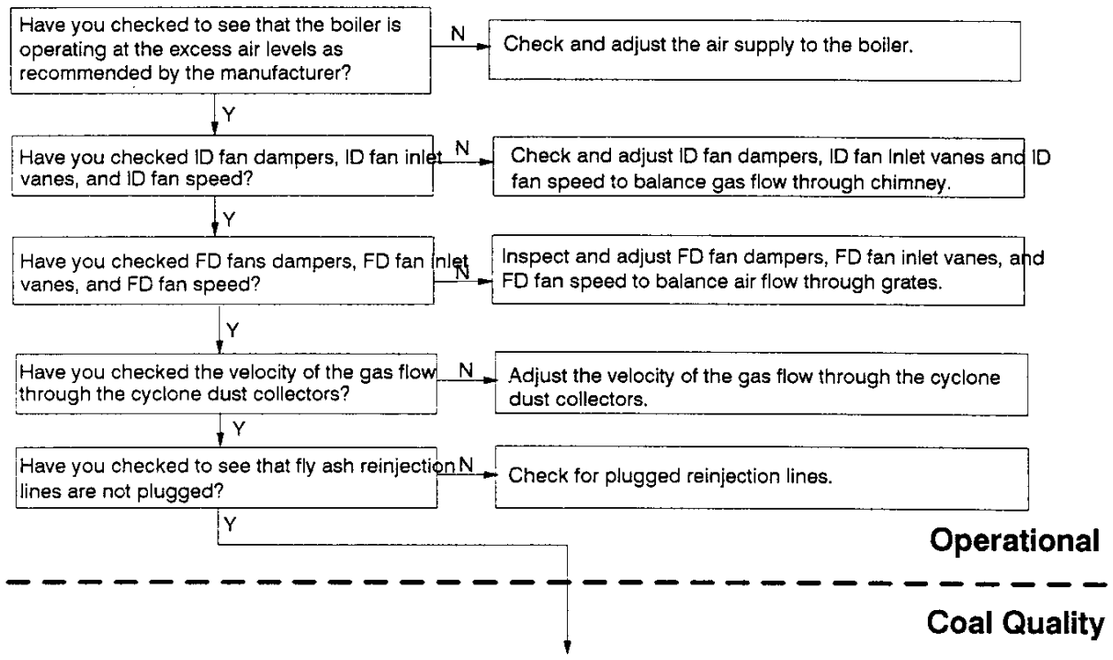


FIG6-72B

FIGURE 6-73: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Erosion Of The Induced Draft Fan



See next page the Coal Quality Section.

FIG6-73n/3

RE 6-73 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG
For Erosion Of The Induced Draft Fan

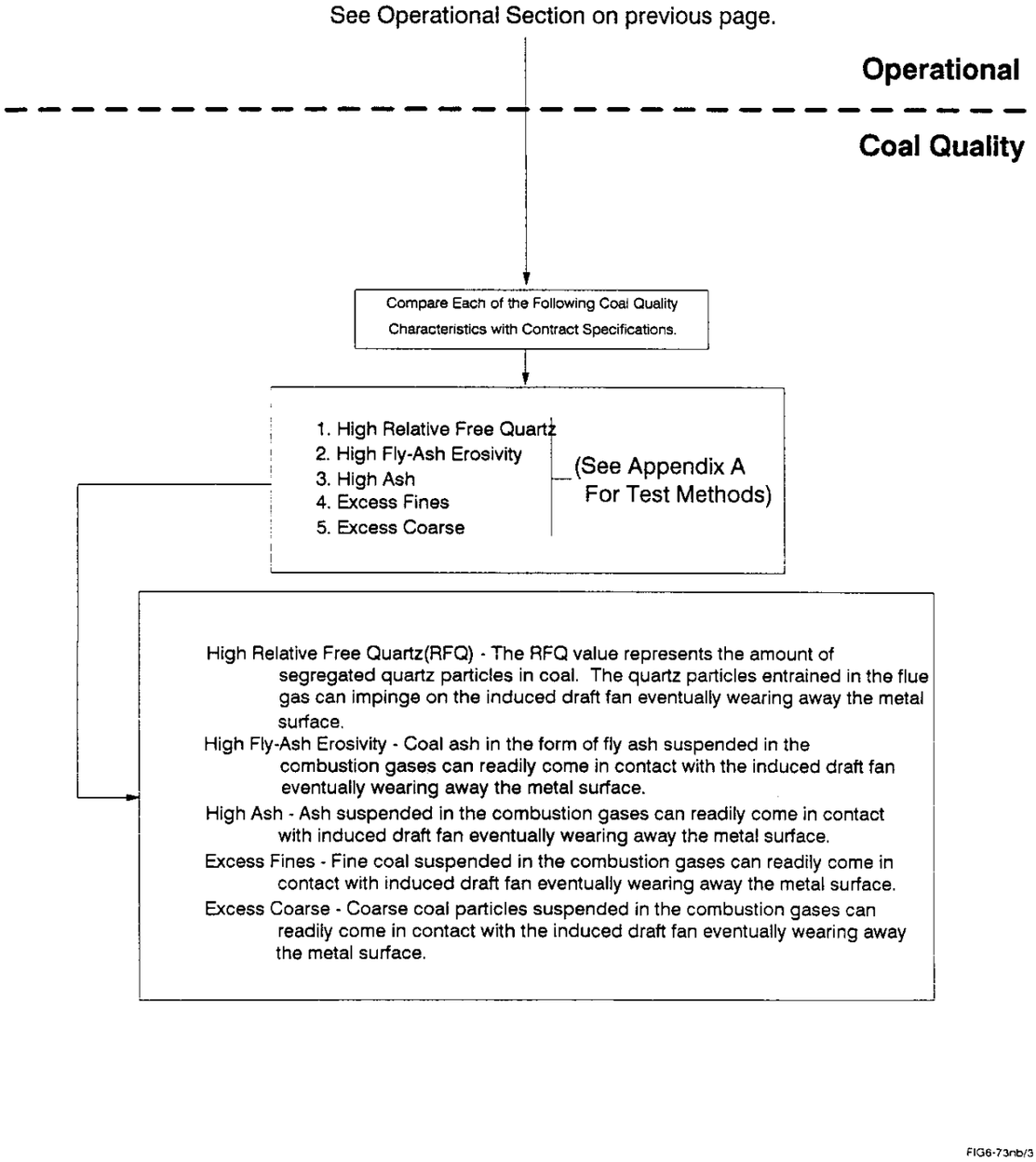
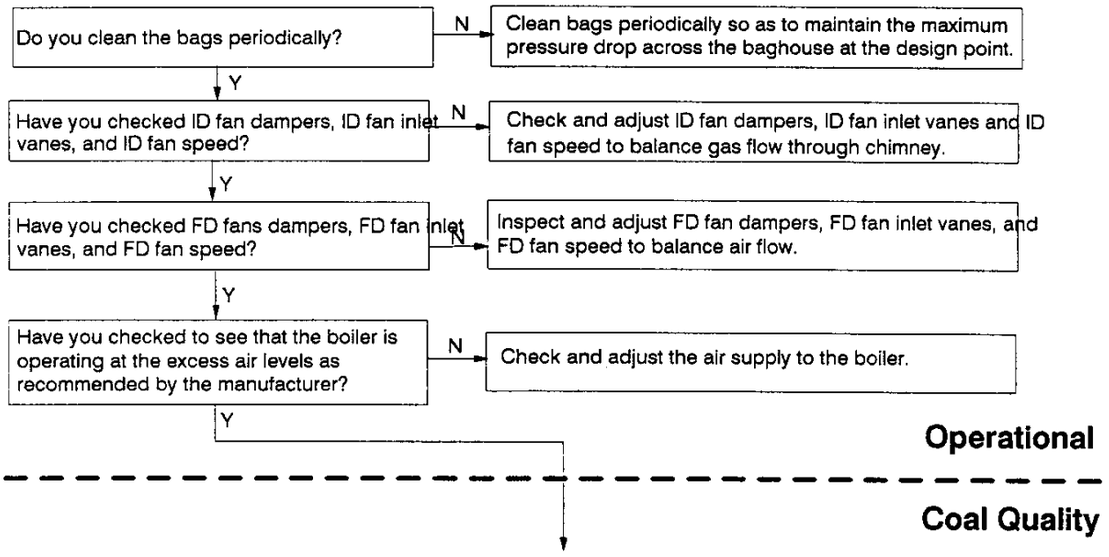


FIG6-73nb/3

FIGURE 6-74: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Carbon Burnout From The Particulate Removal System (Baghouse)



See next page the Coal Quality Section.

FIG6-74r/3

RE 6-74 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG
For Carbon Burnout From The Particulate Removal System (Baghouse)

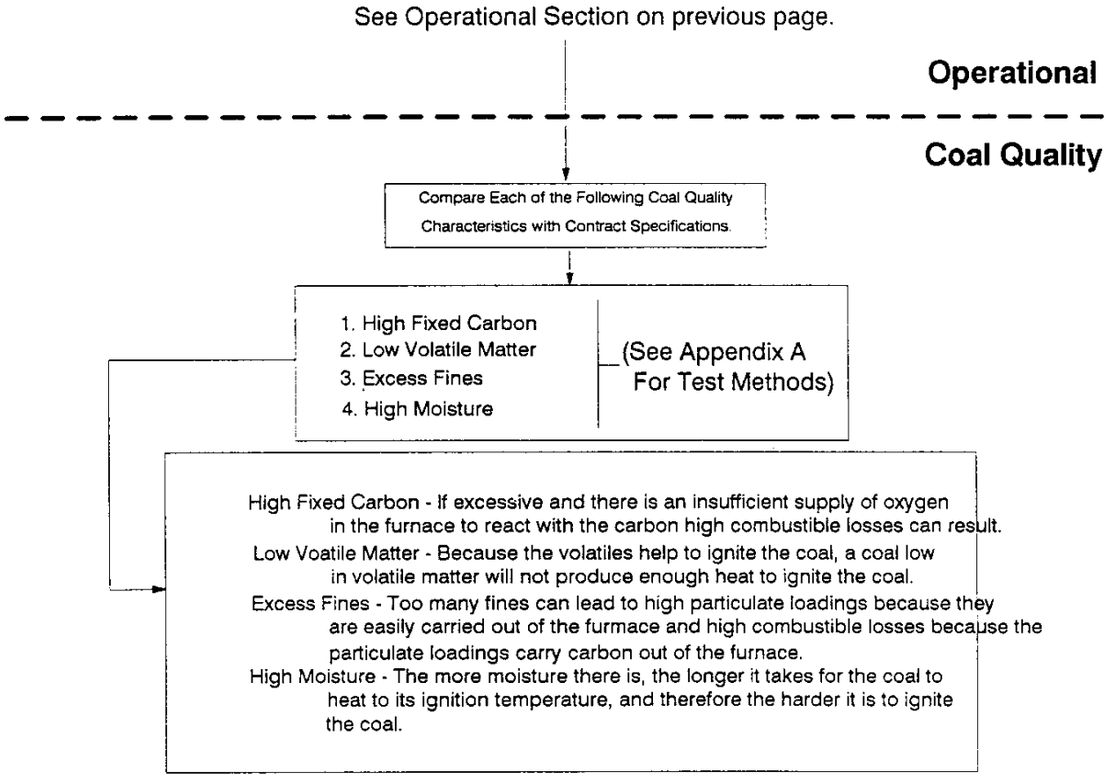


FIG6-74nb/3

FIGURE 6-75: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Excess Particulate Emissions From The Particulate Removal System (Baghouse)

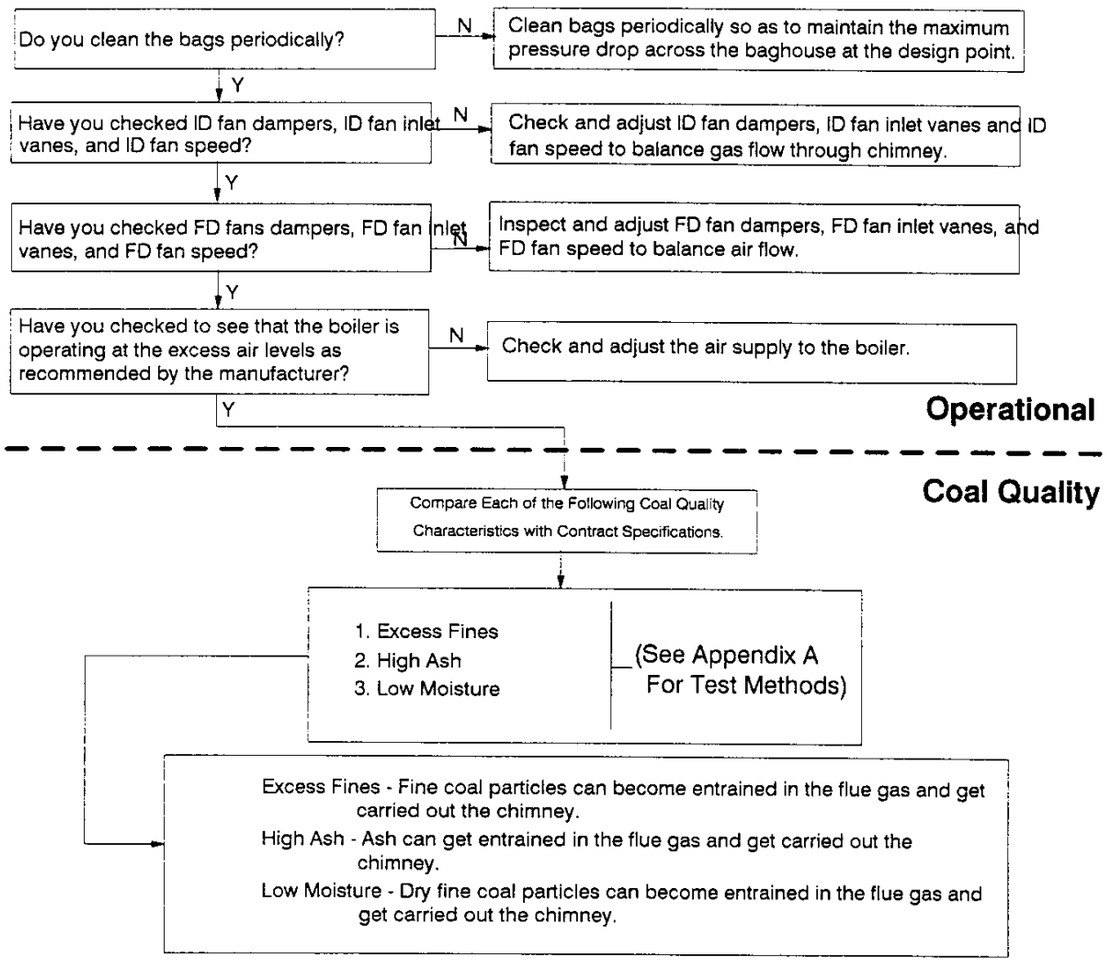
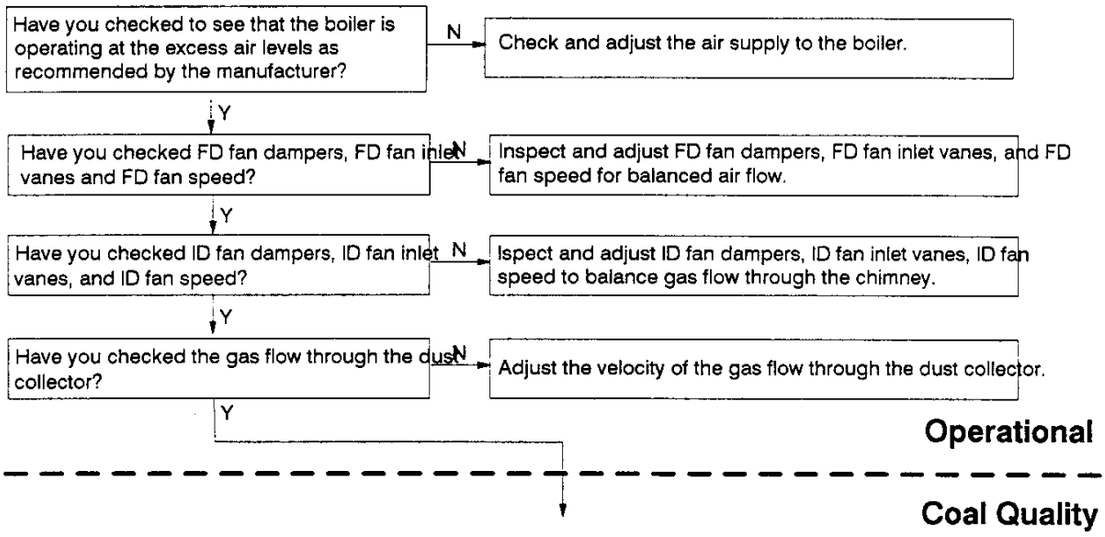


FIG6-75n/3

FIGURE 6-76: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Carbon Burnout In The Particulate Removal System (Cyclone)



See next page for Coal Quality Section

FIG6-76n/3

RE 6-76 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG

For Carbon Burnout In The Particulate Removal System (Cyclone)

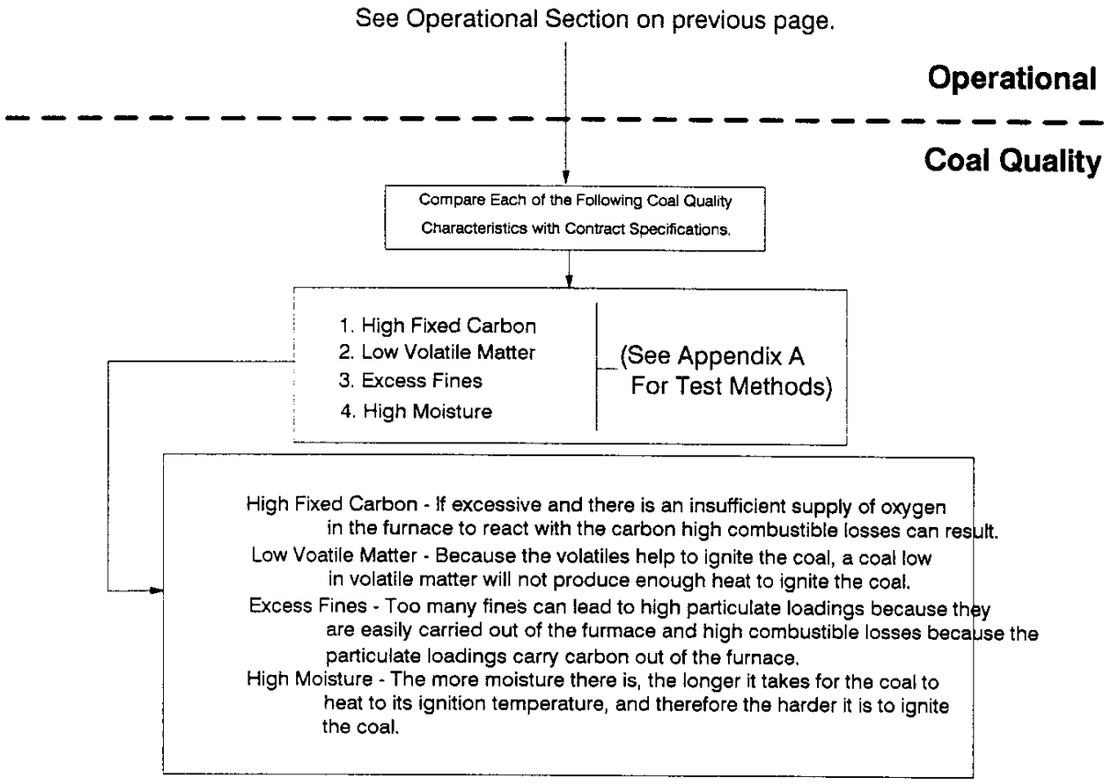
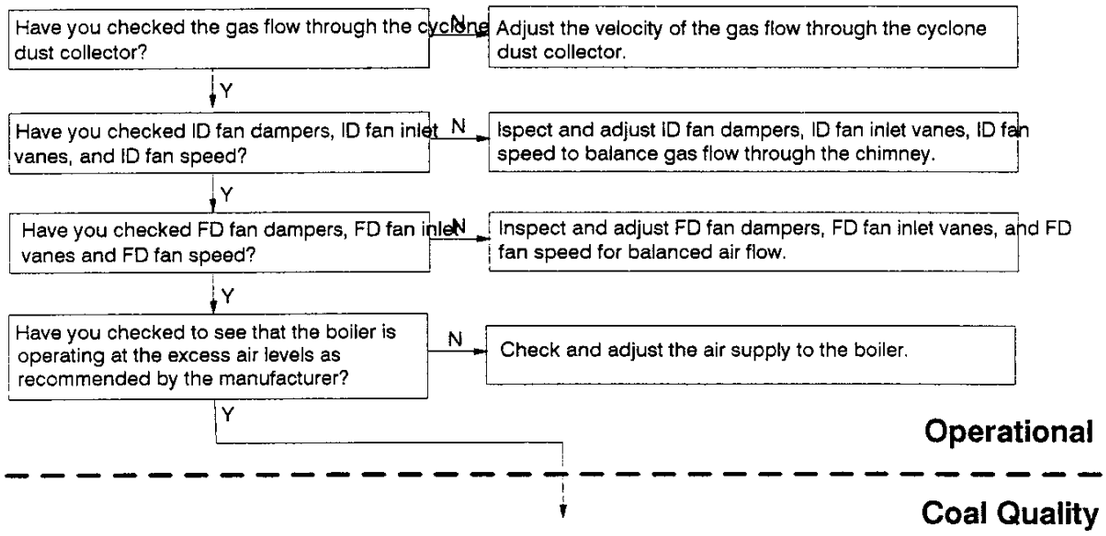


FIG6-76nb/3

FIGURE 6-77: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Erosion In The Particulate Removal System (Cyclone)



See next page for Coal Quality Section

FIG6-77n/3

RE 6-77 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG
For Erosion In The Particulate Removal System (Cyclone)

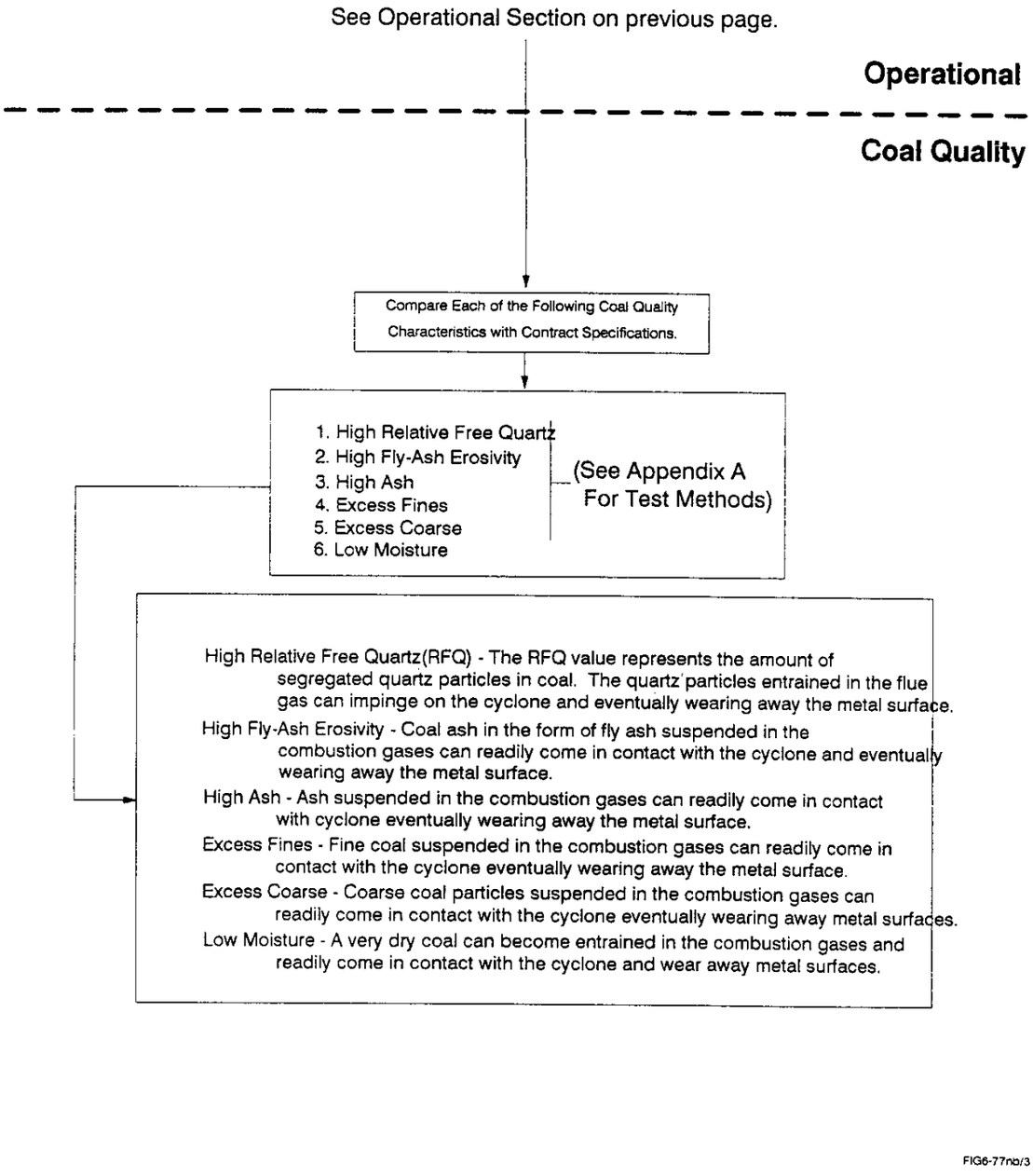


FIG6-77nb/3

FIGURE 6-78: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System (Cyclone)

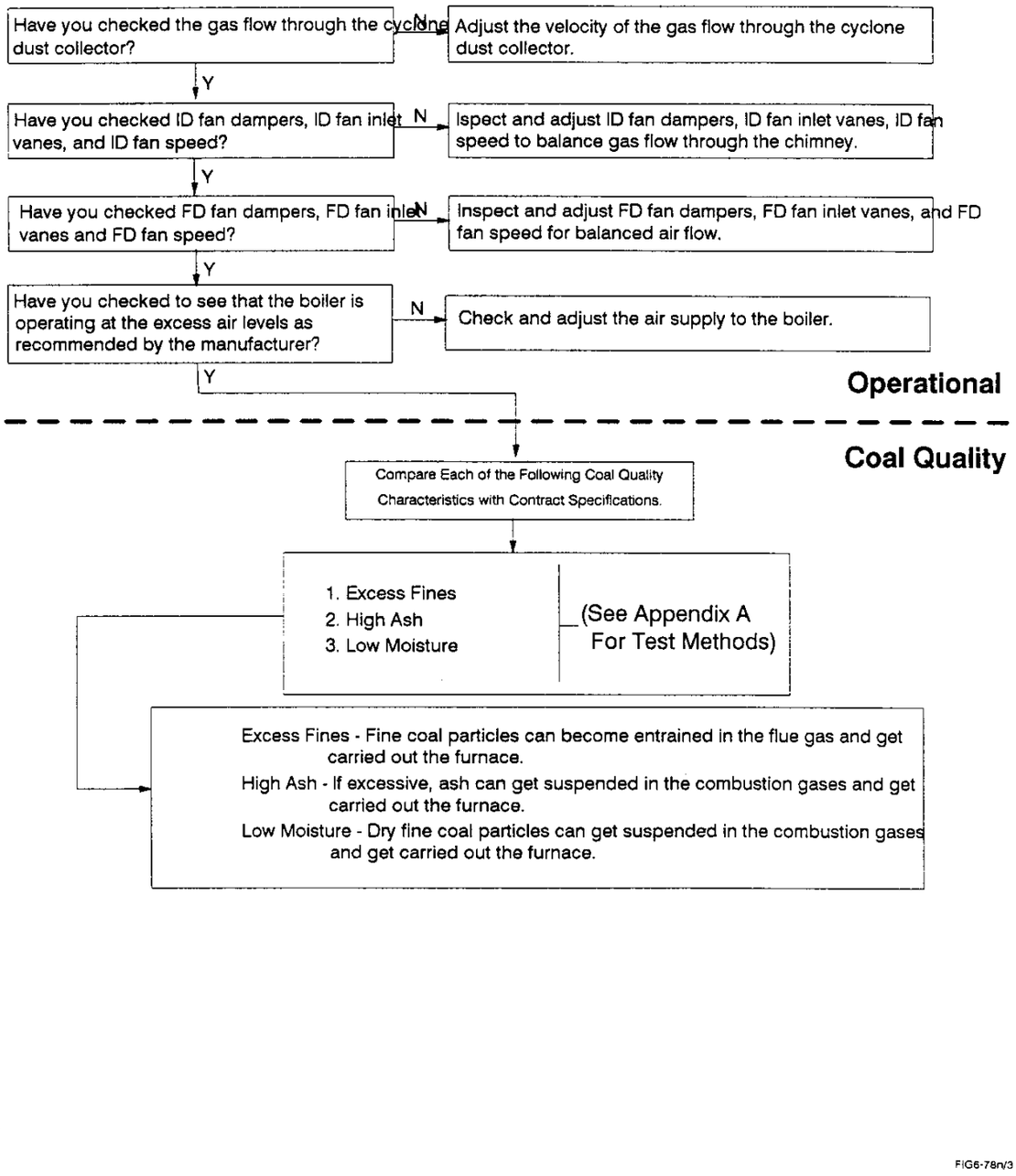
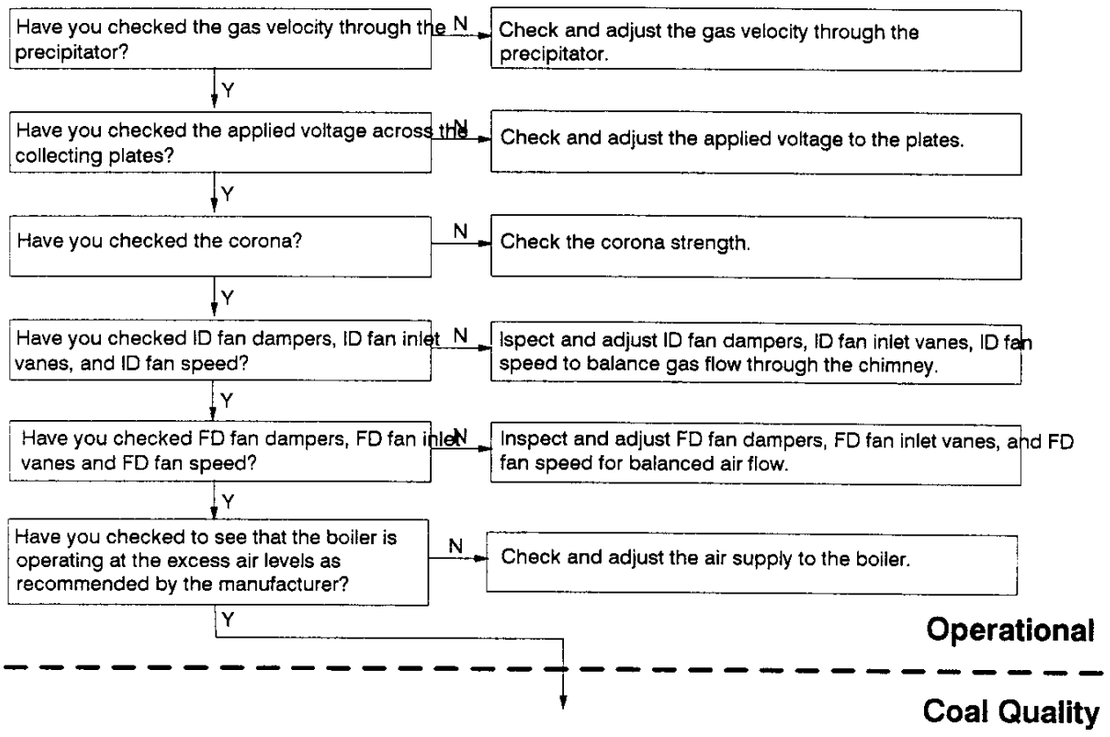


FIG6-78rv3

FIGURE 6-79: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Carbon Burnout In The Particulate Removal System (Electrostatic Precipitator)



See next page for Coal Quality Section.

FIG6-79n/3

RE 6-79 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG

For Carbon Burnout In The Particulate Removal System (Electrostatic Precipitator)

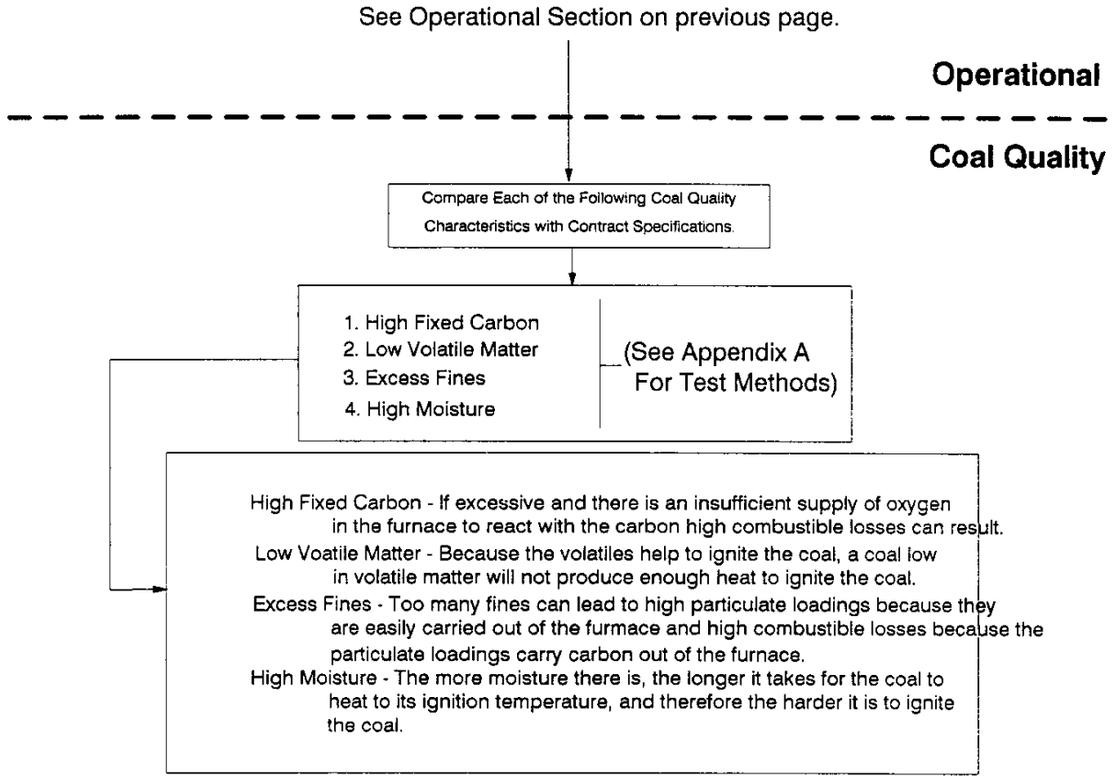
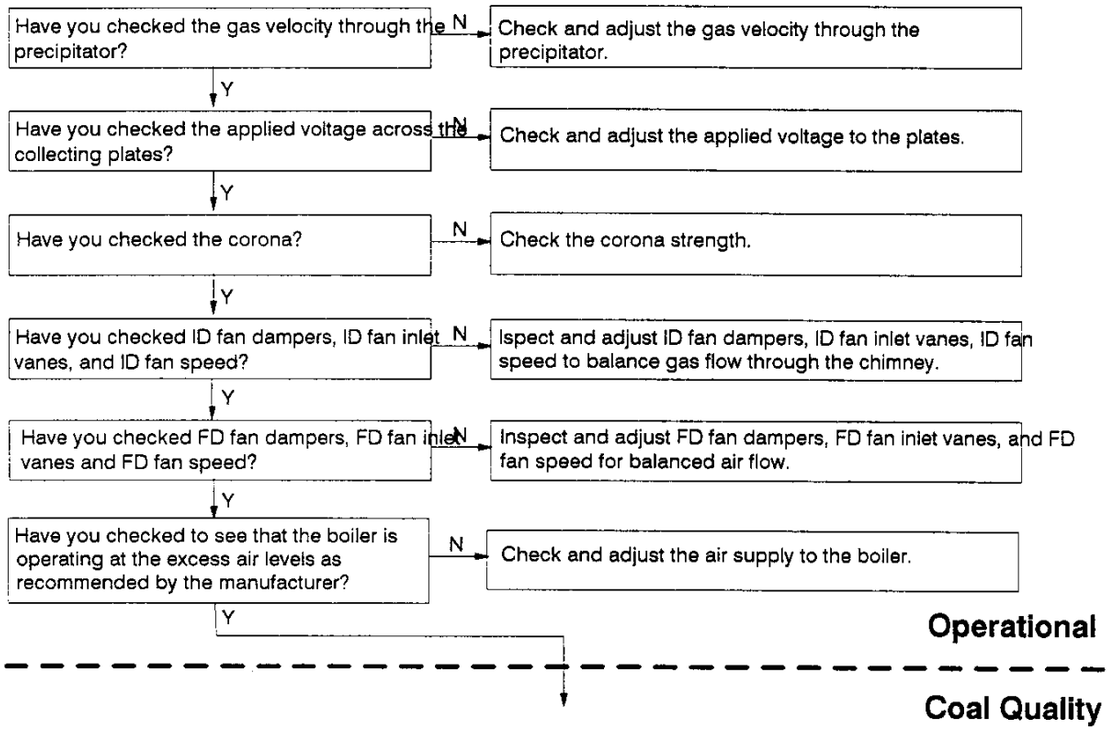


FIG6-79nb/3

FIGURE 6-80: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Erosion Of The Particulate Removal System (Electrostatic Precipitator)



See next page for Coal Quality Section.

FIG6-80n/3

RE 6-80 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAC
For Erosion Of The Particulate Removal System (Electrostatic Precipitator)

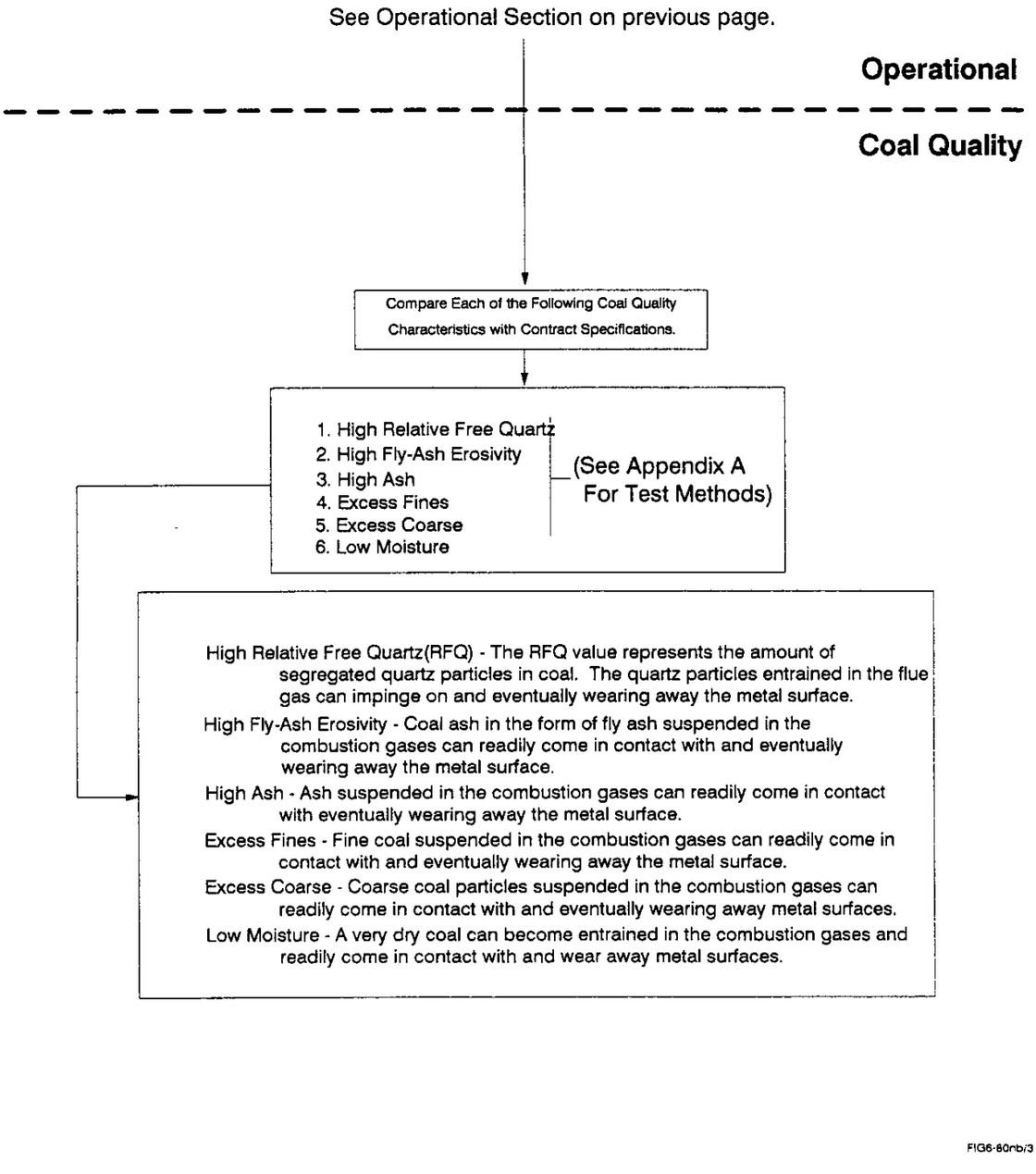
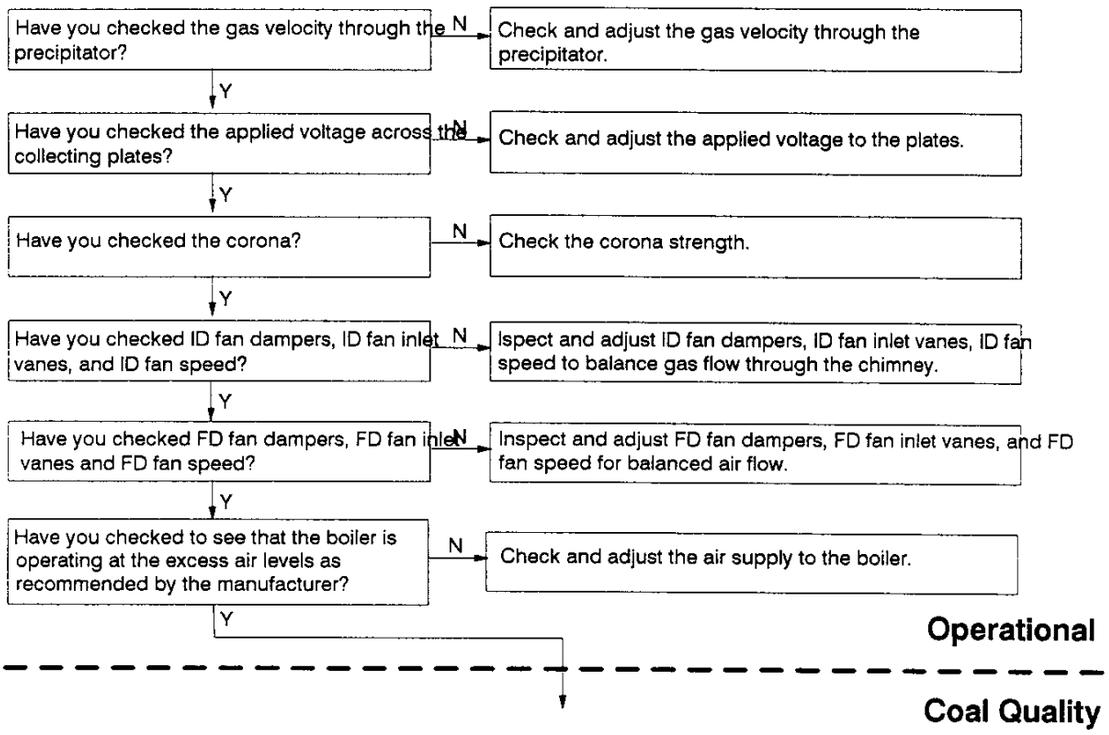


FIG6-80nb/3

FIGURE 6-81: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Electrostatic Precipitator)



See next page for Coal Quality Section.

FIG6-81n/3

FIGURE 6-81 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM

For Excess Particulate Emissions From The Particulate Removal System

(Electrostatic Precipitator)

See previous page for Operational Section.

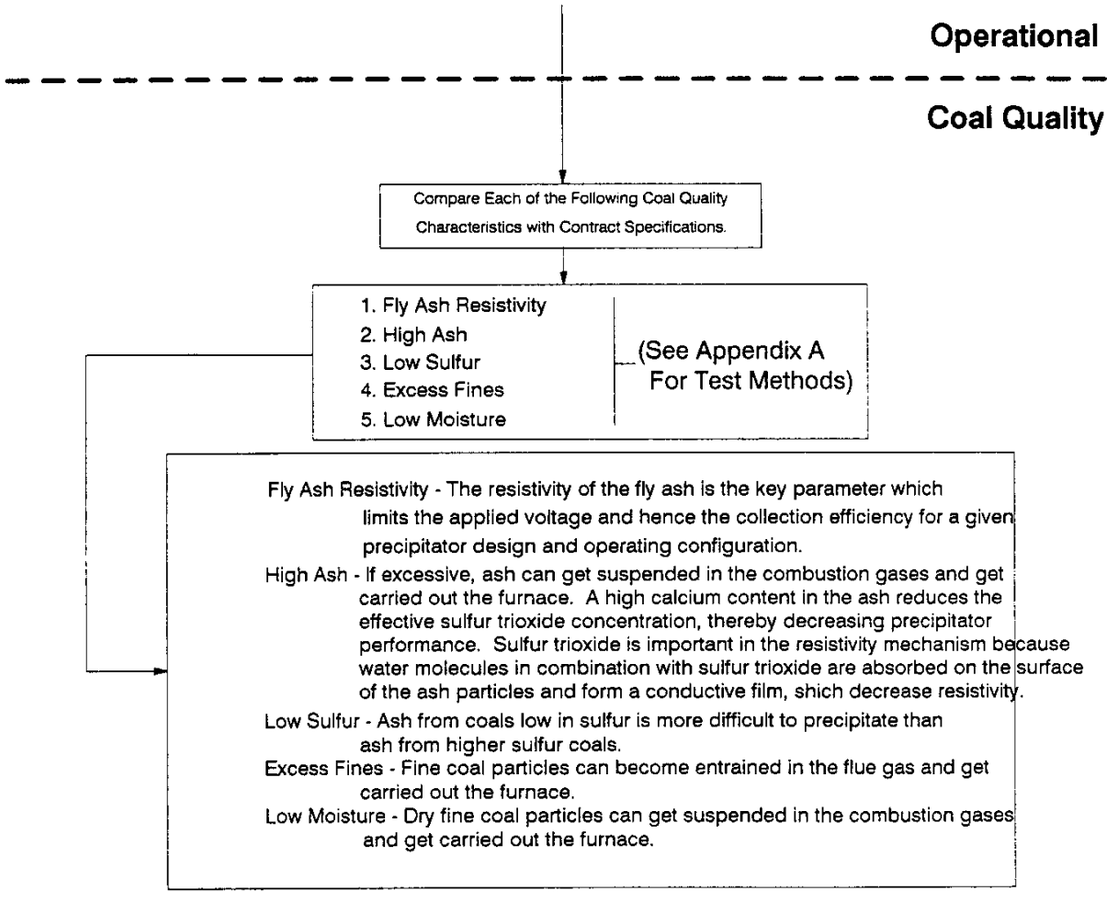
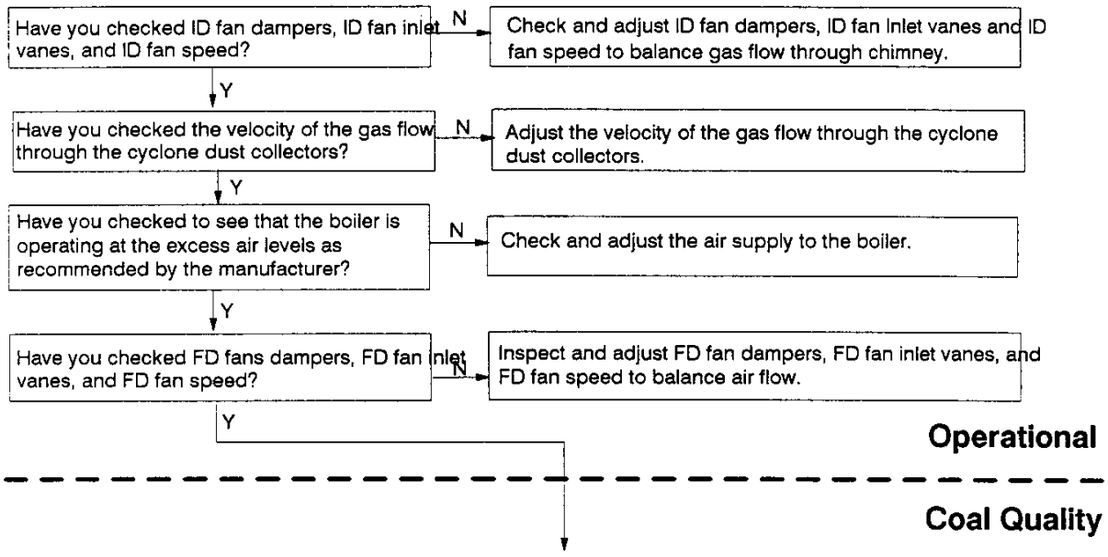


FIG6-81nb/3

FIGURE 6-82: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Fly-Ash Recycle



See next page for the Coal Quality Section.

FIG6-82n/3

RE 6-82 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG
For Carbon Burnout In The Fly-Ash Recycle

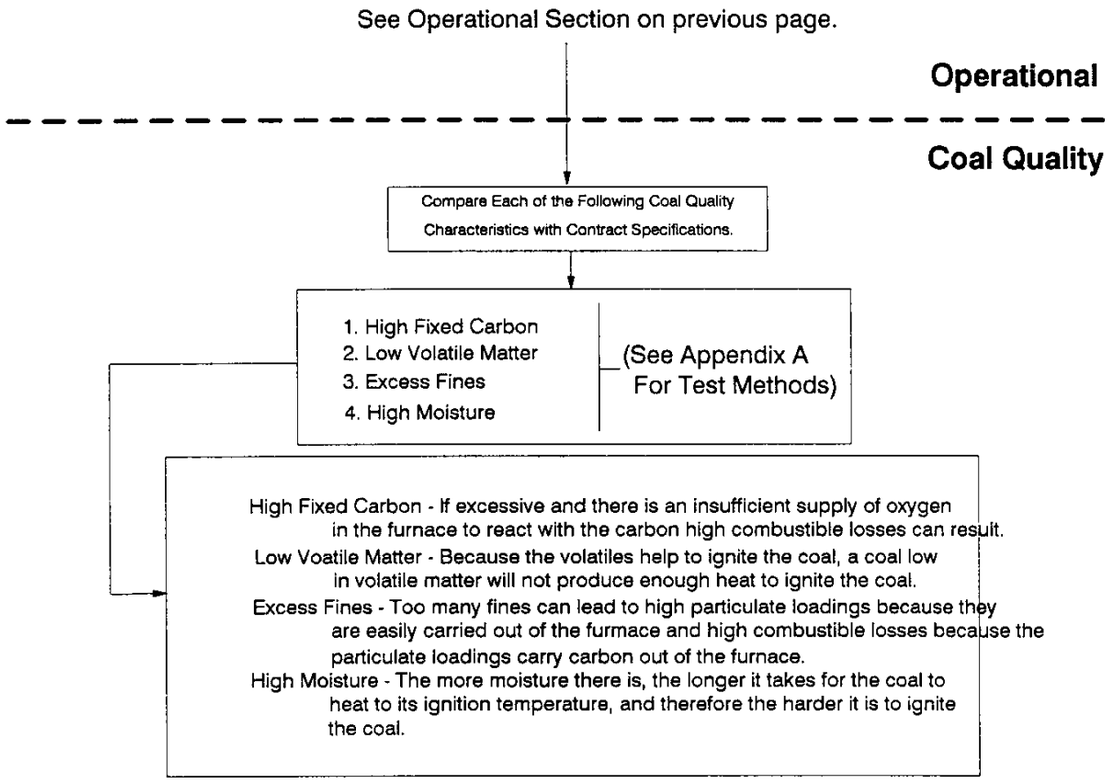


FIG6-82nb/3

FIGURE 6-83: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Ash Hopper/Pit

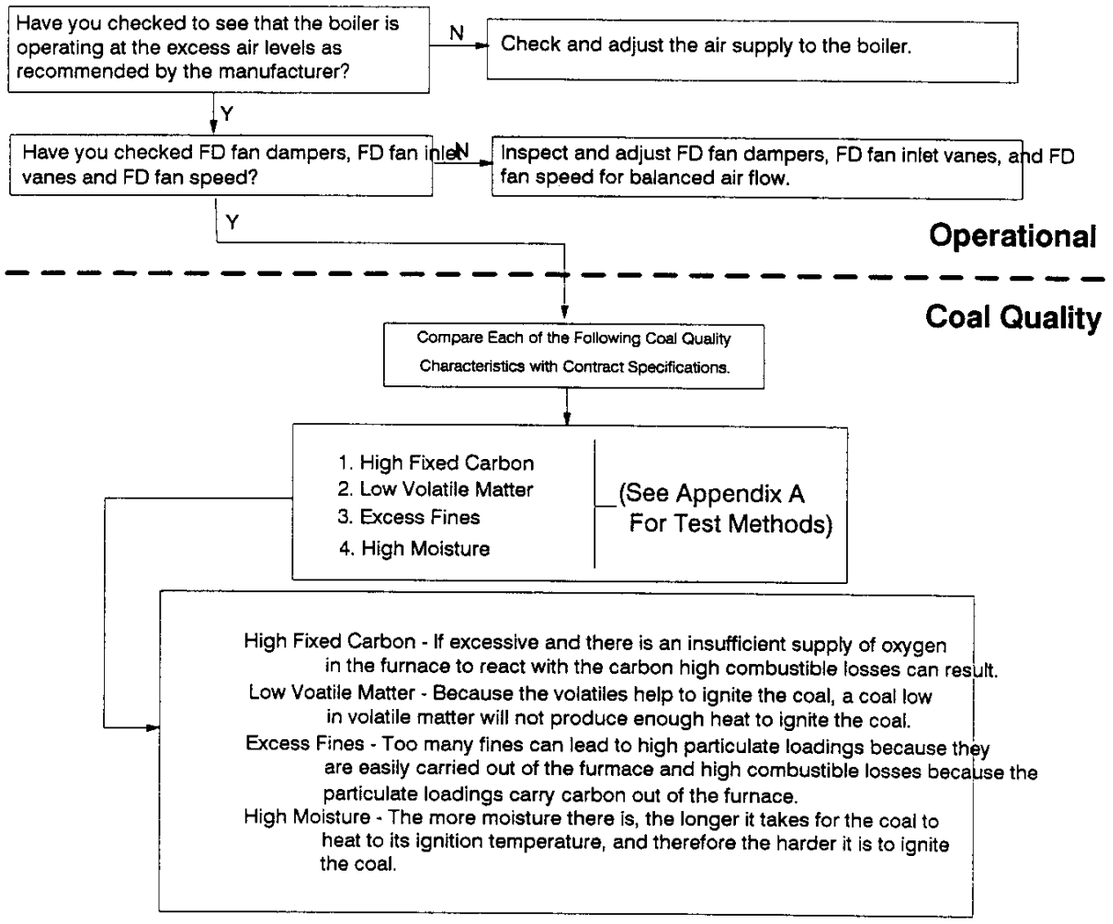


FIG6-83rv3

FIGURE 6-84: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Stack/Chimney

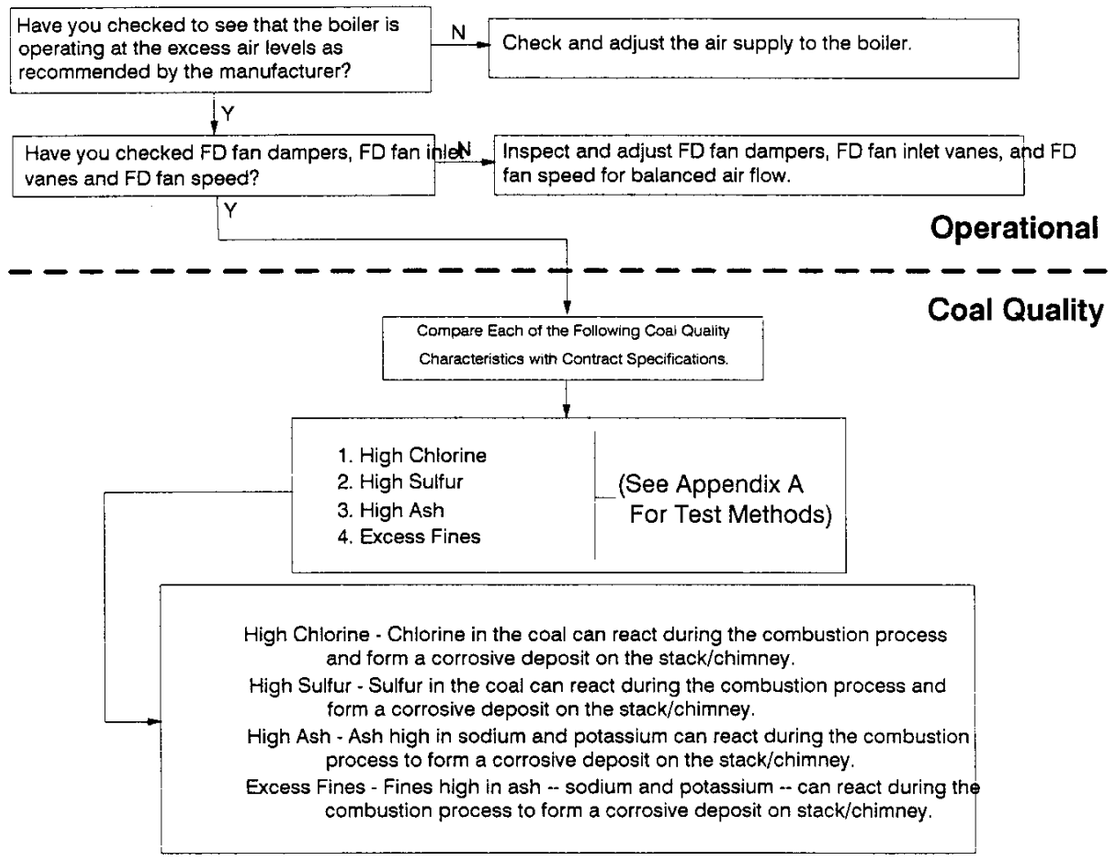
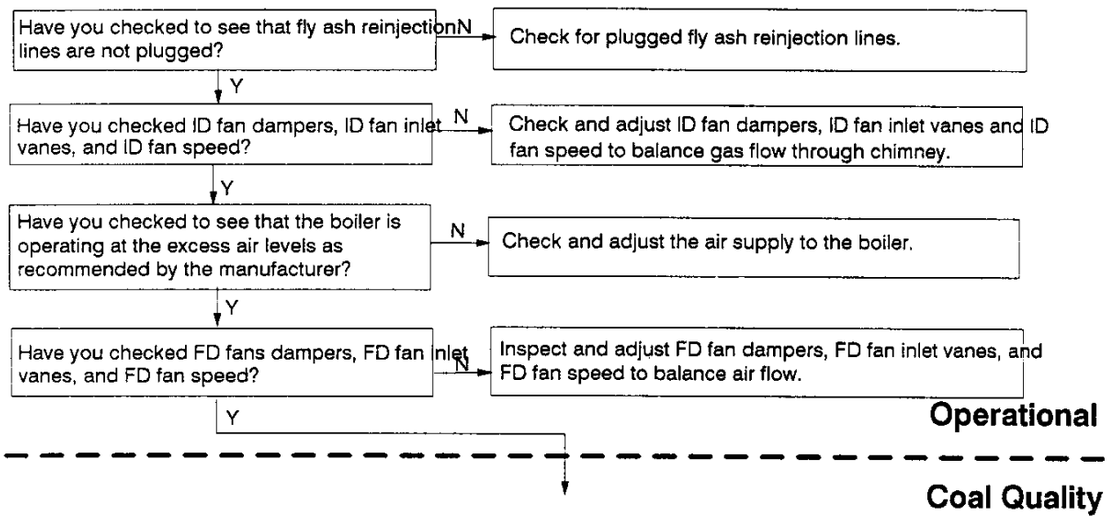


FIG6-84n/3

FIGURE 6-85: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Carbon Burnout In The Stack/Chimney



See next page for the Coal Quality Section.

FIG6-85n/3

RE 6-85 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAC
For Carbon Burnout In The Stack/Chimney

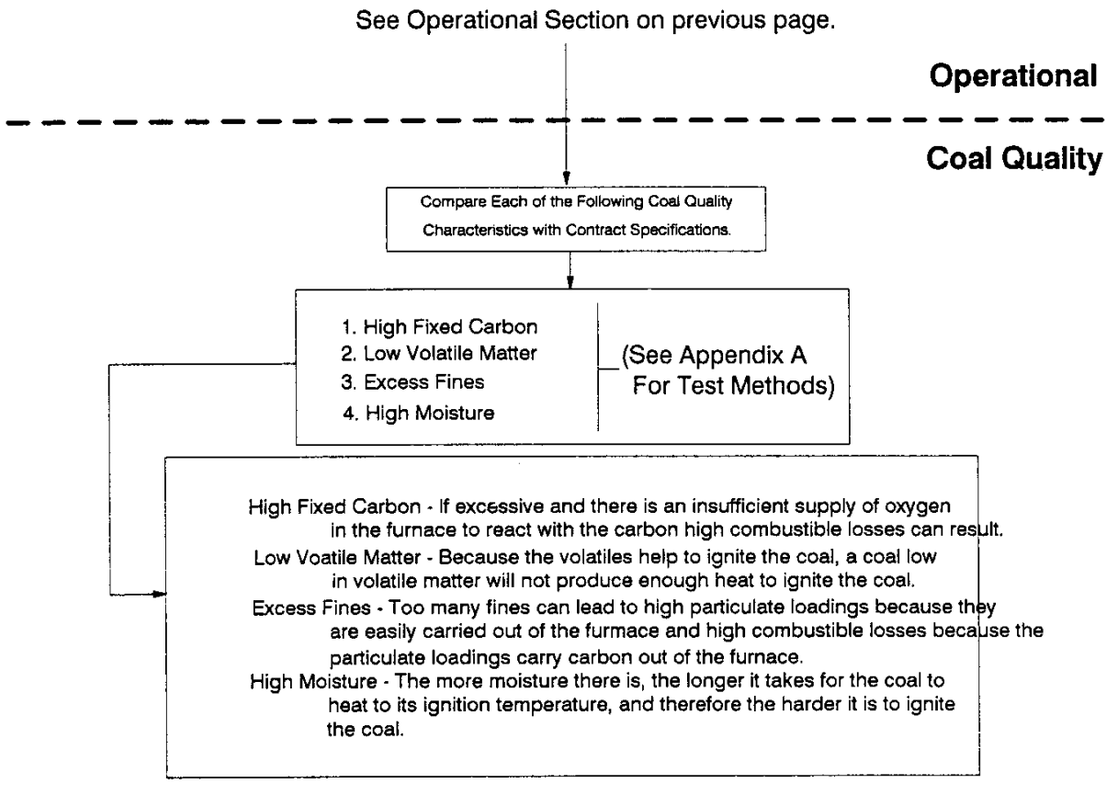
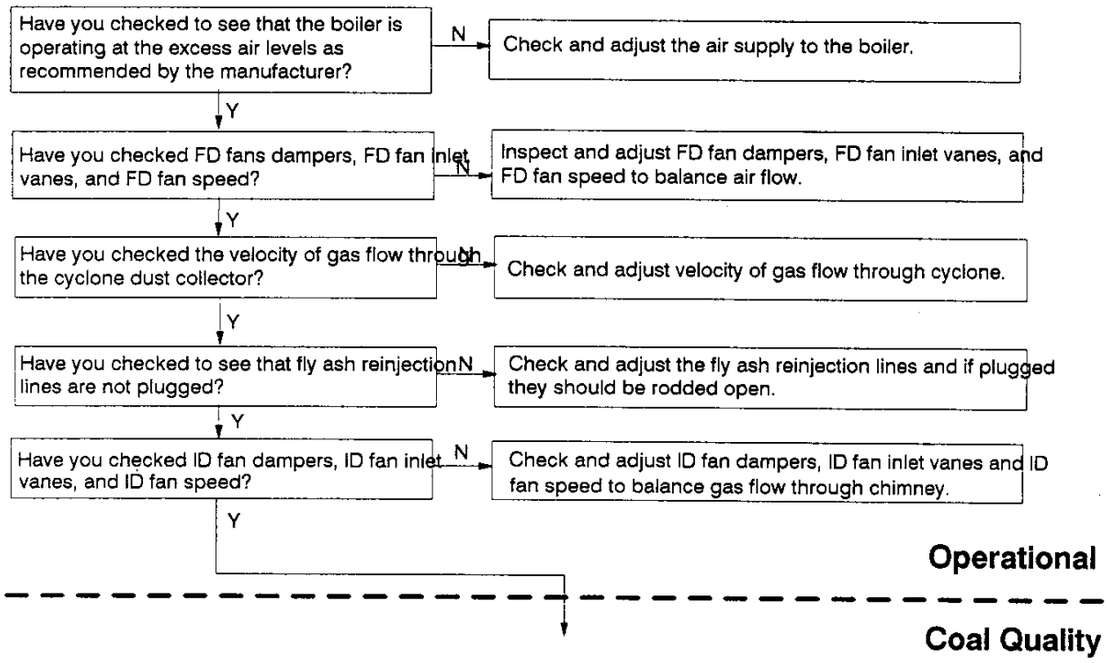


FIG6-85nb/3

FIGURE 6-86: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From Stack/Chimney



See next page for the Coal Quality Section.

FIG6-86r/3

RE 6-86 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG
For Smoking From Stack/Chimney

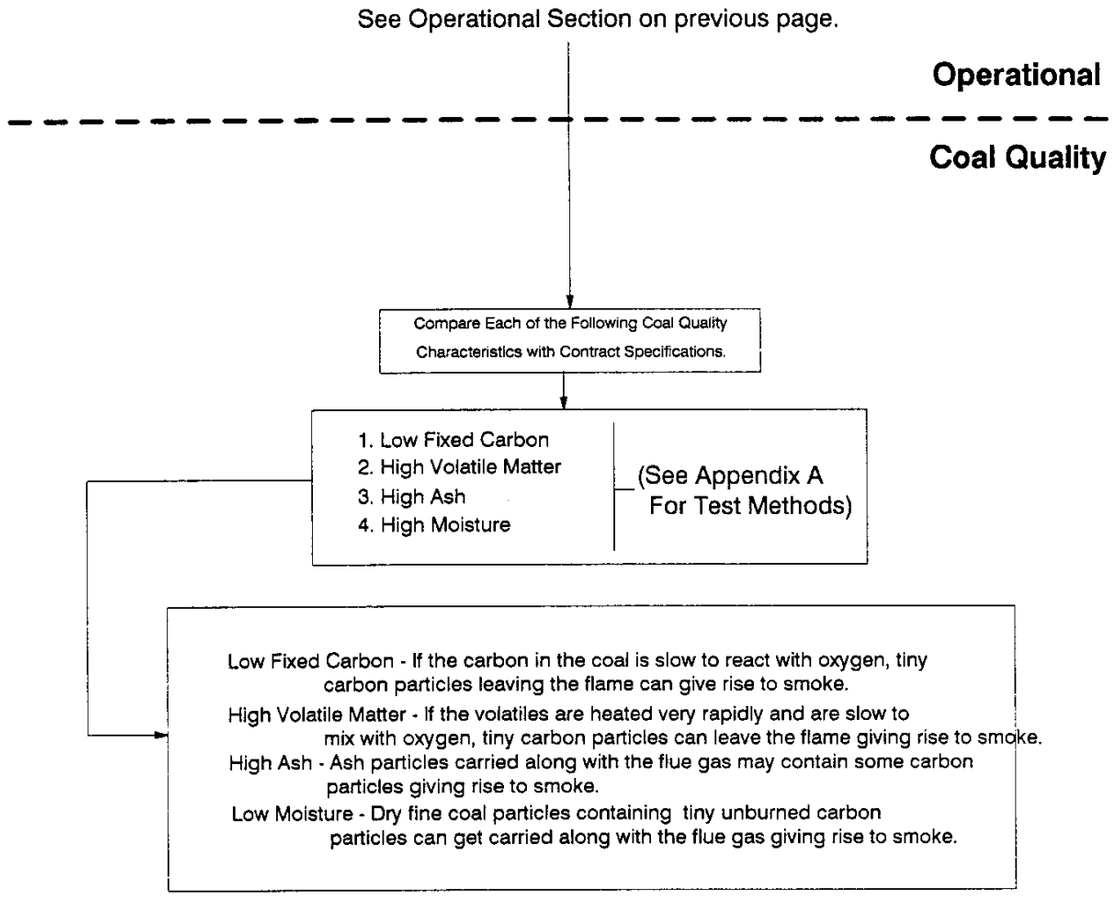
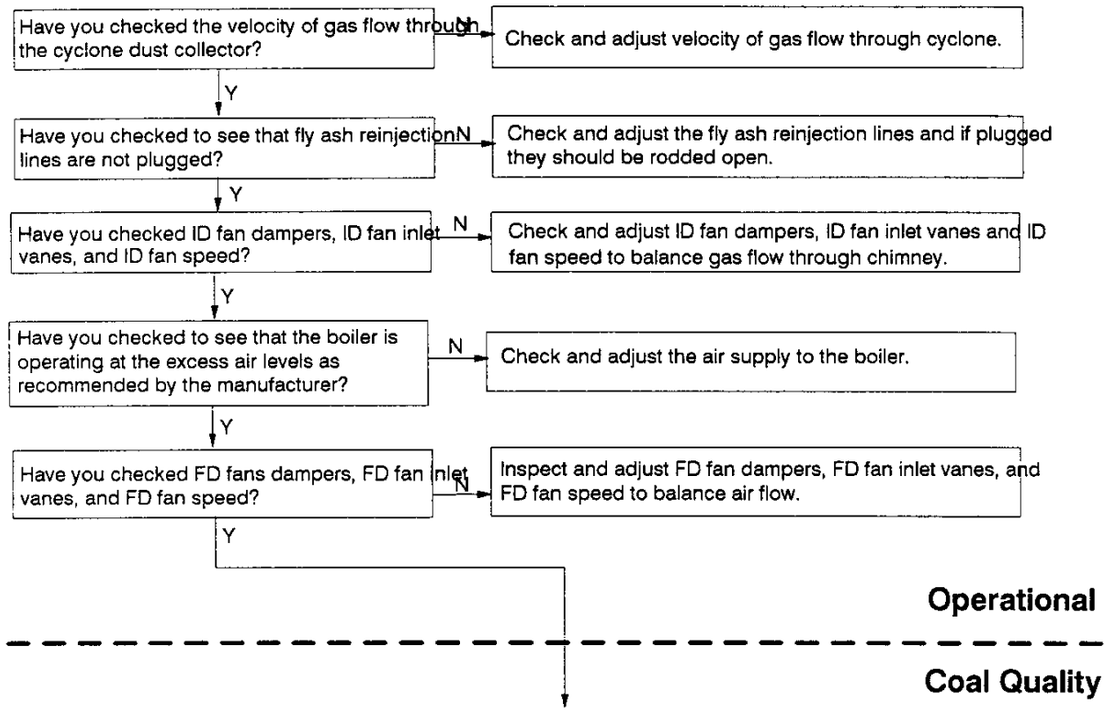


FIG6-86nb/3

FIGURE 6-87: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For Diagnosing Excess Particulate Emissions From The Stack/Chimney



See next page for Coal Quality Section.

FIG6-87n/3

RE 6-87 (CONT'D): ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAG

For Diagnosing Excess Particulate Emissions From The Stack/Chimney

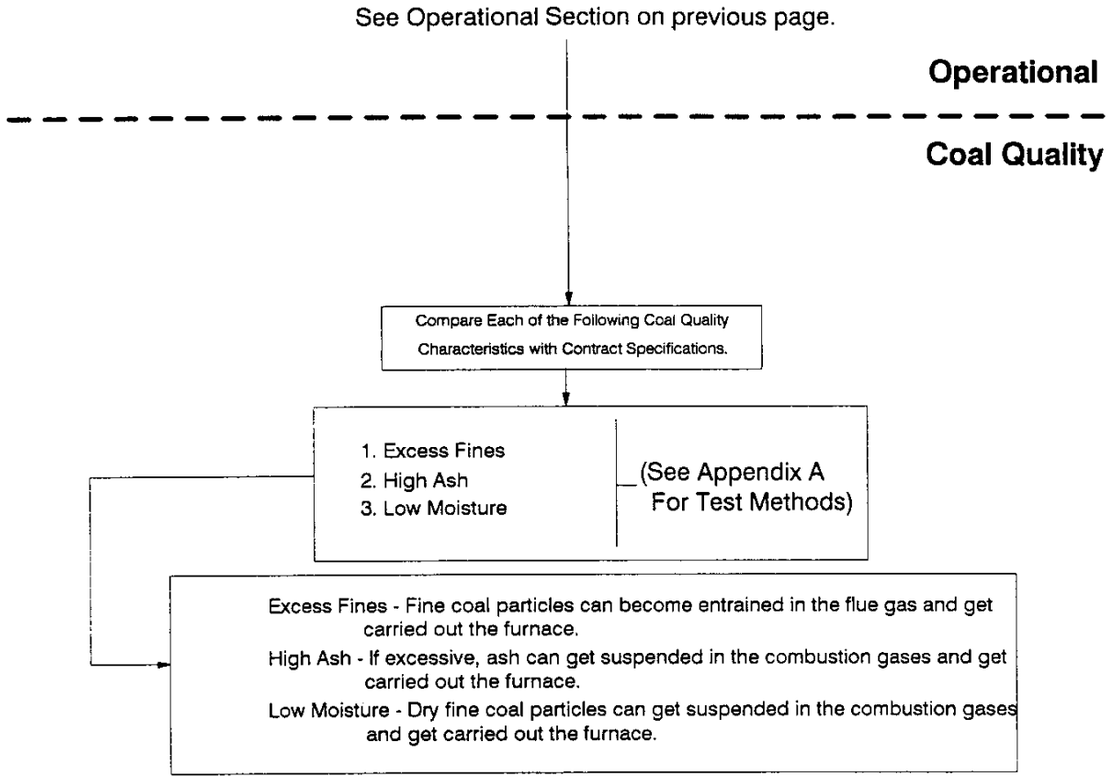


FIG6-87nb/3

FIGURE 6-88: ATMOSPHERIC FLUIDIZED BED TROUBLESHOOTING LOGIC DIAGRAM For SO_2 Emissions From The Stack/Chimney

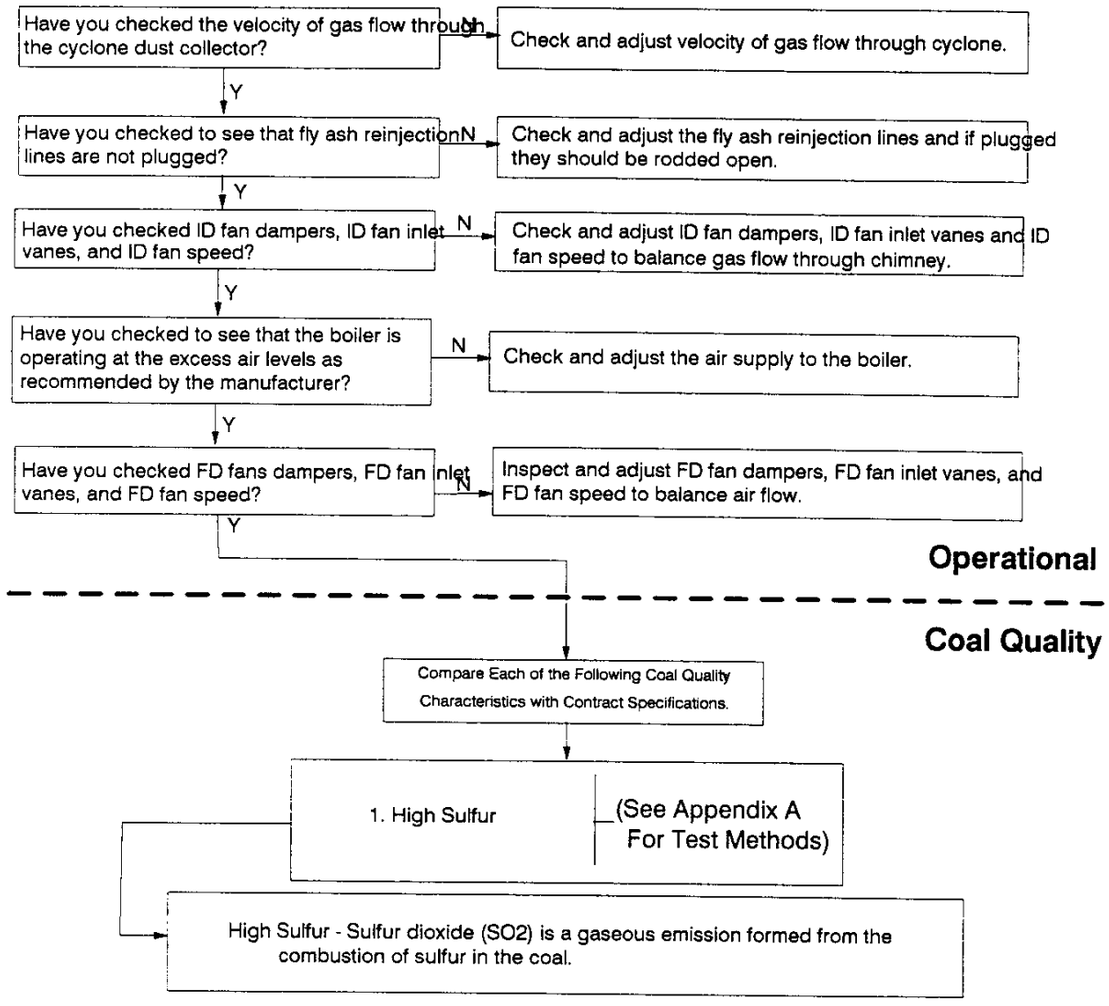


FIG6-88n/3

USACERL DISTRIBUTION

Chief of Engineers
ATTN: CEHEC-IM-LH (2)
ATTN: CEHEC-IM-LP (2)
ATTN: CECC-R
ATTN: CERD-L
ATTN: DAIM-FDF-U

CECPW 22310-3862
ATTN: Library

US Army Materiel Command (AMC)
Alexandria, VA 22333-0001
ATTN: Energy Coordinator
Tooele Army Depot 84074
Tobyhanna Army Depot 18466
Radford Army Ammunition Plant 24141
Rock Island Arsenal 61299
Red River Army Depot 75507

FORSCOM 30330
ATTN: Energy Coordinator
Installations:
Fort McCoy 54656
Fort Drum 13602
Fort Meade 20755

TRADOC 23651
Fort Dix 08640
ATTN: Energy Coordinator

Naval Facilities Engr Command
ATTN: Facilities Engr Command
Code1652B

Holston Army Ammunition Plant 37660-9982
ATTN: Energy Coordinator

Lima Army Tank Plant 45804-1898
ATTN: Energy Coordinator

Fort Wainwright 99703-5000
ATTN: Energy Coordinator

Kings Bay Naval Submarine Base 31547-2606
ATTN: Energy Coordinator

Camp LeJeune USMC 28542-0004
ATTN: Energy Coordinator

Cherry Point USMC Air Station 28533
ATTN: Energy Coordinator

Little Creek Naval Base 23521-2438
ATTN: Energy Coordinator

Norfolk PWC 23511-6098
ATTN: Energy Coordinator

Puget Sound Naval Shipyard 98314-5000
ATTN: Energy Coordinator

Tyndall AFB 32403
ATTN: HQAFCESA/CES

Eielson AFB 99702-1830
ATTN: Energy Coordinator

Wright Patterson AFB 45433
ATTN: Energy Coordintor

Selfridge ANG 48045-5029
ATTN: Energy Coordinator

Warren AFB 82005-2271
ATTN: Energy Coordinator

Griffiss AFB 13441
ATTN; Energy Coordinator

Malmstrom AFB 59402-5000
ATTN: Energy Coordinator

Defense Construction Supply Center 43216-5000
ATTN: Energy Coordinator

Defense Electronis Supply Center 45444-5020
ATTN: Energy Coordiator

Defense Fuel Supply Center 22060-6222
ATTN: DFSC-PR

Defense Tech Info Center 22060-6218
ATTN: DTIC-O (2)